ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 10.] [1910.

LII.—NEW LAURACEAE FROM THE MALAYAN REGION. IV.

J. S. Gamble.

Litsea hirsutissima, *Gamble* [Lauraceae-Litseeae] ; species conspicue molliter aureo-fulvo-villosa, *L. amarae*, Blume, var. *fusco-tomentosae*, affinis, praesertim varietati nostrae *geniculata*, quae foliis orbiculatis bullosis et ramulis geniculatis differt.

Frutex ad 2·5 m. altus ; ramuli crassiores nigrescentes, juniores cum innovationibus, marginibus nervisque foliorum, et inflorescentia pilis longis aureo-fulvis dense tecti. *Folia* membranacea, alterna, elliptica vel elliptico-ovata, acuminata et ad apicem ipsum acumine filiformi munita, basi plus minusve rotundata, supra lucida, infra pallidiora ; 15–20 cm. longa, 7–12 cm. lata ; costa gracilis, supra sulcata ; nervi utrinque 12–15, supra impressi, regulariter ad marginem curvati ; nervuli transversi conspicui paralleli ; recticulatio obscura ; petiolus crassus, 1–2 cm. longus, ad folii basin saepe geniculatus. *Flores* in umbellulis graciliter pedunculatis in axillis foliorum per 3–4 fasciculatis ; pedunculi 1 cm. longi ; bracteae involucrales 4, concavae, marginibus fimbriatae, intus glabrae ; flores in umbellulis 5–6 ; perianthii lobi oblongi, 2–3 mm. longi, glandulosi, apice dentati ; pedicelli brevissimi. *Stamina* florum ♂ 9, filamentis gracilibus ad basin longe villosis superne glabris, ordinum I et II antheris obovatis, ordinis III antheris ovatis, glandulis 2 magnis sessilibus paullo supra basin filamentorum ; florum ♀ staminodia ignota, *Drupa* ignota.

Malay Peninsula. Perak : road to Gunong Hijan, 750 m., *Curtis*, 1344 ; Goping and Thaiping, *King's Collector*, 404, 8379.

Var. **geniculata**, *Gamble*. *Ramuli* ad nodos prominenter geniculati. *Folia* breviora, 8–12 cm. longa, 6–7 cm. lata, ovata vel orbiculata, apice obtusa vel paullo apiculata, basi subcordata, bullata, supra lucida, glabra. *Flores* iis var. *typicae* similes sed antheris aliquando thecis 2 nec thecis 4 vel thecis 2 superioribus minimis, filamentis sparse hirsutis.

Malay Peninsula. Perak : Goping, *King's Collector*, 878.

(18086—6a.) Wt. 92—428. 1375 12/10. D & S.

Litsea spathacea, *Gamble* (Lauraceae-Litseeae); species distincta, perianthio fructifero chartaceo fisso, foliis magnis submembranaceis et drupis pericarpio tenui insignis.

Frutex vel *arbor* parva, vix ad 6 m. alta, 5–8 cm. trunci diametro; ramuli crassiores, pallidi, striati, lenticellati, ultimi puberuli. *Folia* submembranacea, alterna, elliptico-oblonga vel -oblanceolata vel -obovata, apice obtusa vel acuta, aliquando cuspidata, basi curvata vel attenuata, glabra, infra glaucescentia raro rufescentia; 8–24 cm. longa, 5–10 cm. lata; costa pallida, gracilis, supra impressa; nervi utrinque 9–12, pallidi, curvati et prope marginem arcuati; nervuli transversi pauci, fere recti, lucidi, infra reticulatio neque conspicui; petiolus 0·5–2 cm. longus, paullo alatus. *Flores* in umbellulis sessilibus vel brevissime pedunculatis in racemis brevibus paucifloris longebracteatis axillaribus vel lateralibus; bracteae subulatae, 3–5 mm. longae; bracteae involucrales 6, ovato-orbiculares, 5–7 mm. longae, 3 interiores breviores, omnes extra dense tomentosae, intus glabrae; flores in umbellulis 6; perianthii tubus in ♂ 1·5 mm. in ♀ 3 mm. longus; lobi ovati, acuti, ciliati, 3 mm. longi. *Stamina* florum ♂ 9–12, ordinum I et II 4 mm. longa, antheris ovatis filamentis gracilibus, ordinum II et IV glandulis 2 ad basin, 2·5 mm. longa. *Staminodia* florum ♂ etiam 9–12, ordinum I et II clavata, 3 mm. longa, ordinum III et IV 1·5 mm. longa, glandulis 2 oblongis. *Ovarium* florum ♂ rudimentarium minimum, stylo brevi, stigmate peltato; florum ♀ ovoideum, stylo carnoso geniculato, stigmate peltato. *Drupa* ovoidea, apiculata, 1·2–1·5 cm. longa, in perianthii tubo elongato tenui chartaceo 1·2 cm. longo et in segmentis 2–3 fisso insidens, perianthii lobis persistentibus; pericarpium tenue glabrum; cotyledones semi-ovoidei, carnosi.

Malay Peninsula. Perak: at Relan Tujor, Sungie Larut and Maxwell's hill, *Wray*, 2198, 2286, 2755; at Maxwell's hill, *Scortechini*, 1410; among rocks in forest up to 1000 m. alt., *King's Collector*, 3493, 4971, 5130, 5280; *Ridley*. Selangor: at Kwala Lumpur, *Curtis*, 2371.

Var. **tomentosa**, *Gamble*. *Folia* magis obovata, ferrugineo-pubescentia.

Malay Peninsula. Perak, *Scortechini*, 1289.

Litsea singaporensis, *Gamble* [Lauraceae-Litseeae]; species *L. salicifoliae*, Roxb. et *L. laetae*, Wall., affinis, ab hac foliis oblanceolatis et drupa majore, ab illa foliorum nervis et nervulis paucioribus minus conspicuis differt.

Arbor ?; ramuli modice crassi, glabri, pallide brunnei. *Folia* coriacea, alterna, oblongo-lanceolata vel-oblanceolata, apice obtusa vel obtuse acuminata, basi longe cuneata, supra glabra, nitida, infra laevia, glabra, pallida; 15–30 cm. longa, 4–7 cm. lata; costa crassa, complanata vel paullo prominens; nervi utrinque 6–12, obscuri, supra paullo impressi; reticulatio areolata in utraque facie satis conspicua; petiolus brevis, rugosus, 1·5–2 cm. longus. *Flores* in umbellulis puberulis pedunculatis (ad 1·3 cm.), in racemis crassis axillaribus vel lateralibus 7 mm. longis; bracteae involucrales 4, tenues, orbiculares, concavae; flores in umbellulis 5 pedicellis crassis brevibus; perianthii tubus brevis, lobi spathulati, extra ferrugineo-villosi. *Stamina* florum ♂ (alabastra tantum) 12, ordinum interiorum glandulis 2; staminodia florum ♀ ignota, ut

etiam ovarium. *Drupa* depresso-globosa, 1·5 cm. diametro, supra cupulam tenuem brevem hemisphaericam 7 mm. altam 1·6 cm. latam insidens ; cupula matura latior, rugosa vel pustulata, margine integro laevi ; pedicellus incrassatus, brevis, 6–7 mm. longus ; pericarpium laeve, siccitate flavescens.

Malay Peninsula. Singapore : at Bukit Timah, Toas, in Garden jungle and Botanic Garden, *Ridley*, 2118, 3372, 3894, 4135, 4826, 5065, 5736 ; at Tanglin, *Hullett*, 5738.

Borneo : Bongaya river, *Ridley*, 9075.

Litsea perakensis, *Gamble* [Lauraceae-Litseeae] ; species insignis, facie *L. robustam*, Blume, referens, sed racemi multo breviores et drupa minor ; speciebus 3 sequentibus et praecipue *L. pustulatae*, Gamble, affinis, forma et nervatione foliorum, drupa et perianthii tubo fructifero satis differt.

Arbor ad 20 m. alta et 50 cm. trunci diametro ; ramuli nigrescentes, striati, glabri. *Folia* subcoriacea, alterna, oblonga, oblongo-obovata vel -oblanceolata, apice obtusa, acuta vel aliquando acuminata, basi attenuata, supra lucida, olivacea, infra subglauca, utrinsecus glabra, marginibus recurvis ; 15–30 cm. longa, 5–8 cm. lata ; costa crassa, rufescens, supra vix prominens ; nervi utrinque 10–12 irregulariter paralleli, marginem versus curvati, ultimi fere ad apicem ipsum ; nervuli transversi pauci, reticulatio neque obscuri ; petiolus crassus, 1·5–3 cm. longus, glaber. *Flores* in umbellulis pedunculatis in racemis axillaribus vel lateralibus glabris vel minute puberulis vix 1 cm. longis ; pedunculi graciles, 0·8–1 cm. longi ; bracteae lanceolatae, acuminatae ; umbellulae ♂ apertae, 1 cm. latae, floribus 5 ; bracteae involucrales 4, orbiculares, concavae, intus glabrae, 3–4 mm. diametro, pedicelli 2–3 mm. longi; perianthii lobi oblongi, apice ciliati, 3 mm. longi. *Stamina* florum ♂ 9–12, vulgo 12, ordinum I et II 5–6 mm. longa, antheris obovatis et filamentis gracilibus parce villosis, ordinum III et IV breviora, glandulis 2 rotundatis stipitatis prope basim filamentorum; staminodia florum ♀ nondum visa. *Ovarium* in floribus ♂ rudimentarium, stylo crasso, stigmate capitato. *Drupa* lucida, globosa, 1 cm. diametro, apiculata, supra perianthii tubum incrassatum 5 mm. altum, ore 1 cm. diametro del insidens ; pedicellus incrassatus complanatus, 0·8–1 cm. longus, cupulaque tuberculatus ; pericarpium primo albo-maculatum, siccitate flavum.

Malay Peninsula. Perak : at Larut and Goping up to 250 m., *King's Collector*, 5114, 6069, 6085. Johore : at Sungei Telrang, *Ridley*, 13,233. Singapore : at Bukit Timah, *Ridley*, 14,135.

Litsea pustulata, *Gamble* [Lauraceae-Litseeae] ; species *L. perakensi*, Gamble, affinis, foliis latioribus elliptico-oblongis, drupa majore et perianthii tubo fructifero maturitate complanato differt.

Arbor parva vel mediocris, ad 12–18 m. alta et 25–37 cm. trunci diametro ; ramuli crassi, pallidi, striati, ultimi puberuli. *Folia* subcoriacea, alterna, elliptico-oblonga, apice rotundata vel breviter acuminata, basi rotundata vel attenuata, supra lucida, glabra, infra subglauca, marginibus recurvis ; 18–35 cm. longa, 8–14 cm. lata ; costa crassa, supra complanata, nervi utrinque 8–12 paullo impressi, ad marginem curvati, ultimi fere ad apicem attingentes ; nervuli transversi numerosi, arcuati ; reticulatio obscure areolata ; petiolus

crassus, 2-3 cm. longus. *Flores* in umbellulis in racemis brevibus axillaribus vel lateralibus 1 cm. longis. *Drupa* globosa, paullo depressa, 1·5 cm. diametro, supra perianthii tubum incrassatum pustulato-rugosum primo fere clausum, serius hemisphericum, tandem patelliformem insidens; pedicellus incrassatus, etiam rugosus et pustulatus, complanatus, 0·8–1·2 cm. longus; pericarpium laeve, siccitate flavescens.

Malay Peninsula. Perak: in dense forest near Larut up to 250 m., *King's Collector*, 2544, 3418, 5140.

Litsea patellaris, *Gamble* [Lauraceae-Litseeae]; species a *L. perakensi*, Gamble et *L. pustulata*, Gamble, foliis infra glaucis, reticulatione areolata et perianthii tubo fructifero vix pustulato differt.

Arbor patula, ad 12–18 m. alta, 20–30 cm. trunci diametro; ramuli crassi, laeves, ultimi puberuli. *Folia* subcoriacea, alterna, oblonga vel obovata, apice abrupte acuminata, basi cuneata, supra laevia, lucida, glabra, infra glauca, primo minute puberula, tandem glabra, marginibus recurvis; 20–40 cm. longa, 7–14 cm. lata; costa crassa, supra plana; nervi utrinque 8–10, paullo impressi, obliqui et vix ad marginem curvati ibique gradatim arcuati; nervuli transversi numerosi, arcuati, ramosi; reticulatio minute areolata; petiolus crassus, 2–3 cm. longus. *Flores* ignoti, racemi fructiferi axillares, brevissimi. *Drupa* globosa, paullo depressa, 1–1·2 cm. alta, 1·5 cm. diametro, supra perianthii tubum incrassatum complanatum patelliformem 1–1·2 cm. diametro insidens; pedicellus fructifer complanatus, cum cupula 7–8 mm. longus; pericarpium maturum coccineum, lucidum, siccitate flavum, rugatum.

Malay Peninsula. Perak: near Larut, in dense forest at 150–250 m., *King's Collector*, 7312.

Litsea fenestrata, *Gamble* [Lauraceae-Litseeae]; species *L. patellari*, Gamble, affinis, foliis pergamaceis apice rotundatis, nervis magis patulis atque drupa cupula maxime lignosa clausa differt.

Arbor magna ad 30 m. alta; ramuli crassissimi cortice pallido, ultimi angulati et minute puberuli. *Folia* pergamacea, alterna, oblonga vel oblongo-obovata, apice rotundata vel retusa, basi attenuata vel rotundata, saepe inaequalia; supra plus minusve lucida, olivacea, infra subglauca, glabra, marginibus recurvis cartilagineis; 15–35 cm. longa, 8–14 cm. lata; costa crassissima, supra fere complanata; nervi utrinque 10–15, distantes, paullo impressi, ad marginem curvati; nervuli transversi irregulares, ramosi; reticulatio areolata; petiolus crassus, 1–2·5 cm. longus, rugosus. *Flores* in umbellulis breviter pedunculatis in fasciculis densis secus ramulos vetustiores; pedunculi crassi, 7 mm. longi, fusco-puberuli; umbellulae apertae, 1·2 cm. diametro, 6–7, flavae, pedicellis 4 mm. longis; bracteae involucrales 4–5, orbiculares vel obovatae, concavae, extus fulvo-puberulae; perianthii lobi 6, oblongi, obtusi, extus villosi, intus glabri, 4–5 mm. longi. *Stamina* florum ♂ numero variabilia, normaliter 12, ordinum I et II 6–7 mm. longa, antheris ellipticis decurrentibus et filamentis gracilibus parce villosis basi interdum glandulas ferentibus; ordinum III et IV breviora, glandulis 2 oblongis bifidis stipitatis prope basin filamentorum; staminodia florum ♀ ignota. *Ovarium* in floribus ♂ rudimentarium 0. *Drupa*

globosa, 2·2 cm. diametro, primo perianthii tubo incrassato pyriformi furfuraceo omnino circumdata ; serius cupula 2 cm. longa, ore aperto rotundo 1–1·2 cm. diametro inclusa ; tandem ore fere 2·5 cm. lato, semi-exserta ; pedicellus incrassatus, crassus, 5 mm. longus ; pericarpium crassum, primo cereo-album, tandem purpureum.

Malay Peninsula. Perak : near Larut to 250 m., *King's Collector*, 5938, 6859.

Sumatra. At 450 m., *Forbes*, 3174.

Borneo. Near Kuching, *Haviland*, 3088?.

Litsea Foxiana, *Gamble* [Lauraceae-Litseeae] ; species cum sequente *L. monticola*, Gamble, foliorum nervis parallelis plurimis insignis, ab illa foliis apice cuspidatis et racemis griseo-pubescentibus differt.

Arbor mediocris ; ramuli crassi, pallidi, ultimi angulati, minute ferrugineo-pubescentes ut etiam foliorum petioli et costa et inflorescentia. *Folia* subcoriacea, alterna, elliptica vel elliptico-oblonga vel -obovata, apice longe cuspidato-acuminata, basi attenuata, supra fusca, opaca, costa et nervis exceptis glabra, infra glaucescentia et minute puberula, marginibus recurvis ; 10–20 cm. longa, 5–7 cm. lata ; costa crassa, conspicua, pubescens ; nervi utrinque 12–16 paralleli, vix curvati nisi ad marginem, ultimi 2 vel 3 arcuatim juncti ; nervuli transversi plurimi, recti, paralleli ; reticulatio obscura ; petiolus crassus, 2–3 cm. longus. *Flores* in umbellulis graciliter pedunculatis (6 mm.), in racemis griseo-pubescentibus, axillaribus vel lateralibus ad 2 cm. (♂) vel 5 mm. (♀) longis ; racemi aliquando fasciculati per 2–3 ; umbellulae apertae, diametro 1 cm. (♂) vel 8 mm. (♀) floribus 5–6 ; bracteae involucrales 4, orbiculares, concavae, 4–5 mm. diametro ; perianthii lobi oblongi, obtusi vel acuti, villosi, ciliati, 3 mm. (♂) vel 1·5–2 mm. (♀) longi. *Stamina* florum ♂ 8–10, normaliter 9, ordinum I et II 3–4 mm. longa, antheris ovatis et filamentis graciliter villosis ; ordinum III et IV breviora, glandulis 2 parvulis subsessilibus prope basin filamentorum. *Staminodia* florum ♀ normaliter 9, ordinum I et II clavata, 2–3 mm. longa, filamentis villosis ; ordinum III et IV subulata, glandulis 2 ovatis prope basin. *Ovarium* in floribus ♂ 0, in ♀ globosum, glabrum ; stylo crasso curvato, stigmate magno bifido. *Drupa* ignota.

Malay Peninsula. Perak: at Moniot's road, *Curtis*, ♂ 2305, and ♀ without number.

Litsea monticola, *Gamble* [Lauraceae-Litseeae] ; species nervis parallelis insignis, *L. Foxianae*, Gamble, affinis, foliis acutis nec cuspidatis infra haud glaucescentibus, umbellulis glabris, floribus dense villosi differt.

Arbor ad 12–15 m. alta et 45–60 cm. trunci diametro ; ramuli crassi, pallidi, subquadrangulares, furfuracei, glabri. *Folia* coriacea, alterna, elliptica vel elliptico-oblonga vel -obovata, apice acuta vel acuminata et paullo mucronata, basi attenuata, utrinsecus glabra, olivacea, infra rufescentia, marginibus recurvis ; 10–20 cm. longa, 4–6 cm. lata ; costa conspicua, supra impressa ; nervi utrinque 8–12, subparalleli, impressi, ad marginem curvati ; nervuli transversi recti, subparalleli, obscuri ; reticulatio obscure areolata ; petiolus crassus, nigrescens, glaber, sulcatus, 1·5 cm. longus. *Flores*

in umbellulis pedunculatis in racemis axillaribus vel lateralibus 8–10 floris, ad 2 cm. longis; pedunculi glabri, 6–8 mm. longi; bracteae involucrales 4, orbiculares, 4–5 mm. diametro; flores in umbellulis 5, aureo-fulvo-villosi; perianthii lobi 6, ovati, acuti vel acuminati, extra dense villosi, intus glabri, glandulosi. *Stamina* florum ♂ numero et ordine variabilia, 8–13, normaliter 9; ordinum I et II 3 mm. longa, antheris oblongis et filamentis dense villosis; ordinum III et IV breviora, glandulis 2 magnis ovatis subsessilibus prope basin filamentorum. *Ovarium* in ♂ 0. *Staminodia* florum ♀ et *drupa* ignota.

Malay Peninsula. Perak: top of Gunong Ejon, 1200–1400 m., and near Taiping, 1000–1200 m., *King's Collector*, 7000, 8454.

Litsea Scortechinii, *Gamble* [Lauraceae-Litseeae]; species obscura, foliis lanceolatis, acuminatis, conspicue minute areolatis insignis.

Arbor ?; ramuli castaneo-fulvi, ferrugineo-puberuli, paullo angulati, innovationes aureo-pubescentes ut etiam inflorescentia. *Folia* chartacea, alterna, lanceolata vel elliptico-lanceolata, apice longe et tenuiter acuminata, basi attenuata, supra praeter nervos glabra, minute reticulata, infra pubescentia; 10–17 cm. longa, 4–6 cm. lata; costa gracilis, conspicua, supra impressa et puberula; nervi utrinque 6–10, supra impressi, paribus suboppositis, ad marginem curvati et ibi arcuatim juncti; nervuli transversi numerosi; reticulatio minute areolata; petiolus gracilis, 1–2 cm. longus. *Flores* in umbellulis pedunculatis in racemis crassissimis axillaribus vel lateralibus 3–5 mm. longis; bracteae involucrales 5, membranaceae, intus glabrae, marginibus fimbriatae; flores in umbellulis 5; perianthii lobi oblongi, dense aureo-villosi. *Stamina* florum ♂ normaliter 9, ad basin conspicue longe villosi; ordinum I et II antheris subquadratis; ordinum III et IV glandulis 2 oblongis sessilibus ad dimidiam partem filamentorum. *Staminodia* florum ♀ et *drupa* ignota.

Malay Peninsula. Perak: at Haram Parah, *Scortechini*, 866.

Litsea oblanceolata, *Gamble* [Lauraceae-Litseeae]; species *L. ochraceae*, Boerl., affinis, foliis oblanceolatis, racemis multo brevioribus et umbellulis sessilibus differt.

Arbor parva, ad 10–12 m. alta et 45 cm. trunci diametro; ramuli pallide fusci, graciles, lenticellati; innovationes et inflorescentia ferrugineo-pubescentes. *Folia* chartacea, alterna, oblanceolata, apice obtusa, acumine brevi, basi longe cuneata, utrinsecus glabra, supra pallide fusca, infra subglauca; 10–23 cm. longa, 3–6 cm. lata; costa gracilis; nervuli transversi recti, sed obscuri ut etiam reticulatio; petiolus gracilis, tortus, 1–1·5 cm. longus. *Flores* in umbellulis sessilibus in racemis axillaribus et lateralibus 7 mm. longis; bracteae ovatae, tomentosae; bracteae involucrales 4, orbiculares, concavae; flores in umbellulis 4–5, pedicellis 2 mm. longis; perianthii lobi ovati, obtusi, intus glabri, 2 mm. longi. *Stamina* florum ♂ 9–12, gracilia, glabra, ordinum I et II exserta, ordinum III et IV breviora, glandulis 2 oblongis sessilibus paullo supra basin filamentorum; staminodia florum ♀ ignota. *Ovarium* in floribus ♂ rudimentarium, parvum, stylo gracili, stigmate parvo bifido. *Drupa* ignota.

Malay Peninsula. Perak : moist places near Larut up to 90 m., *King's Collector*, 1952, 2020.

Litsea Kunstleri, *Gamble* [Lauraceae-Litseeae] ; species insignis, *L. sebiferae*, Blume, affinis, racemis fasciculatis brevissimis differt ; *L. perakensi*, Gamble, etiam accedit, sed foliis chartaceis apice rotundatis griseis distinguenda.

Arbor ad 18 m. alta et circa 50 cm. trunci diametro ; ramuli crassi, angulati, grisei vel glauci, glabri. *Folia* chartacea, alterna, oblonga vel oblongo-lanceolata, apice rotundata vel emarginata, basi attenuata et paullo rotundata, supra olivacea, infra subglauca, utrinsecus glabra ; 15–30 cm. longa, 6–12 cm. lata ; costa gracilis supra paullo sulcata ; nervi utrinque 12–14, graciles, ad marginem curvati et in sinus arcuatos desinentes, supra impressi ; petiolus crassus, glaber, supra sulcatus, 1–2 cm. longus. *Flores* in umbellulis griseo-puberulis pedunculatis, in racemis brevibus crassis fasciculatis (circa 10) axillaribus vel lateralibus ad 1 cm. longis ; pedunculi graciles 8 mm. longi ; bracteae ovatae, caducae ; umbellulae apertae ad 1·2 cm. latae, floribus 7, pedicellis 2 mm. longis ; bracteae involucrales 4–6, externae orbiculares, internae obovatae, intus glabrae ; perianthii lobi 6, oblongi vel obovati, 3–4 mm. longi, glandulosi, intus glabri. *Stamina* florum ♂ 12, ordinum I et II ad 4 mm. longa, antheris ovatis et filamentis gracilibus villosis ; ordinum III et IV breviora et glandulis 2 reniformibus stipitatis prope basin filamentorum munita, staminodia florum ♀ ignota. *Ovarium* in floribus ♂ rudimentarium parvum, stylo gracili. *Drupa* ignota.

Malay Peninsula. Perak : near Gunong Pondo and Gunong Bubu, up to 250 m., *King's Collector*, 7527, 7670.

Litsea claviflora, *Gamble* [Lauraceae-Litseeae] ; species *L. gemelliflorae*, Boerl., affinis, foliis crassioribus, pedunculis haud filiformibus et umbellulis ex axillis foliorum plurimis differt.

Arbor ad 10–12 m. alta et 20–25 cm. trunci diametro; ramuli crassi, pallidi, innovationibus puberulis exceptis glabri. *Folia* chartacea, alterna, elliptico-lanceolata vel -oblanceolata, apice breviter acuminata, basi attenuata, supra olivacea, opaca, infra glauca ; 10–18 cm. longa, 4–8 cm. lata ; costa gracilis supra impressa ; nervi utrinque circa 6, impressi, ad marginem curvati et ibi gradatim arcuati ; nervuli transversi conspicui, distantes, reticulatione conspicua juncti ; petiolus gracilis, 0·8–1 cm. longus. *Flores* in umbellulis subglabris longe pedunculatis per 2–3 fasciculatis in racemis brevissimis ex axillis foliorum ultimorum vel foliorum delapsorum ; pedunculi claviformes, 1–2 cm. longi ; umbellulae apertae circa 7 mm. latae, floribus 5 ; bracteae involucrales 4, orbiculares, concavae, 4 mm. latae ; perianthii tubus brevis, intus villosus, lobi 6 oblongi, obtusi, glandulosi, glabri, 2 mm. longi. *Stamina* florum ♂ 12, ordinum I et II 3–4 mm. longa, antheris ellipticis et filamentis villosis ; ordinum III et IV breviora, antheris oblongis obtusis et glandulis 2 subsessilibus quadratis prope basin filamentorum ; staminodia florum ♀ ignota. *Ovarium* in floribus ♂ rudimentarium, conicum, glabrum. *Drupa* ignota.

Malay Peninsula. Perak : near Thaiping, at 150–300 m., *King's Collector*, 8492.

Litsea Curtisii, *Gamble* [Lauraceae-Litseeae] ; species *L. Panamonjae*, Ham., affinis, foliis latioribus submembranaceis ellipticis, racemis glabris et ramulis angulatis differt.

Arbor magna, patula, ad 24–30 m. alta et 60–90 cm. trunci diametro ; ramuli crassi, angulati, fere alati, nigrescentes. *Folia* submembranacea, alterna, elliptica vel elliptico-obovata, apice rotundata et brevissime acuminata, aliquando emarginata, basi attenuata et subcuneata, utrinsecus glabra, infra glaucina ; 15–26 cm. longa, 6–11 cm. lata ; costa crassa, immersa ; nervi utrinque 13–15, supra paullo impressi, primo recti deinde curvati et prope marginem gradatim arcuati ; nervuli transversi distantes, obscuri, sicut reticulatio ; petiolus crassus, nigrescens, rectus, 2–2·5 cm. longus. *Flores* in umbellulis pedunculatis distantibus in racemis axillaribus vel lateralibus vel etiam subterminalibus 10–25 cm. longis (♂) vel 10 cm. longis (♀) ; pedunculi 6 mm. longi ; umbellulae apertae 1 cm. latae in ♂, in ♀ angustiores, flores in umbellulis 5–6 ; bracteae involucrales 4, glabrae vel minutissime puberulae, concavae, patulae ; perianthii tubus 2·5 mm. longus, intus villosus, lobi 6–9, membranacei, obovati, acuti, 3·5 mm. longi in ♂, in ♀ breviores. *Stamina* florum ♂ 9–14, vulgo 9, glabra, ordinum I et II 4 mm. longa, antheris ovatis apiculatis et filamentis gracilibus, ordinum III et IV glandulis 2 reniformibus, stipitatis, prope basin filamentorum ; staminodia florum ♀ 12–16, ordinum I et II spathulata, glandulosa, ordinum III et IV subulata, glandulis 2 magnis sessilibus ad dimidiam partem filamentorum. *Ovarium* in ♂ rudimentarium, minimum, in tubo perianthii inclusum, stylo minuto ; in ♀ ovoideum glabrum, stylo crasso curvato, stigmate peltato. *Drupa* non visa.

Malay Peninsula. Penang : Government Hill, 360 m., *Curtis*, 2449. Perak : near Larut, 90–150 m., *King's Collector*, 6161 ; *Scortechini*, 162.

Litsea megacarpa, *Gamble* [Lauraceae-Litseeae] ; species insignis, *L. Noronhae*, Blume, affinis, racemis brevioribus puberulis nec tomentosis, foliis coriaceis, et drupa maxima cupula patelliformi suffulta differt.

Arbor magna, patula, ad 18–30 m. alta ; ramuli crassi, ultimi angulati, nigrescentes, glabri. *Folia* coriacea, alterna, glabra, elliptico-oblonga vel -obovata, apice obtusa, apiculata, raro cuspidata, basi attenuata, supra lucida, brunnea, infra cinerea, marginibus paullo recurvis ; 15–45 cm. longa, 7–20 cm. lata ; costa crassa, supra immersa ; nervi utrinque 10–15, distantes, irregulares, marginem versus curvati ; nervuli transversi obscuri, irregulares, ramosi ; reticulatio areolata ; petiolus crassus, curvatus, 1·5–6 cm. longus, supra sulcatus. *Flores* in umbellulis graciliter pedunculatis in racemis gracilibus axillaribus vel lateralibus 10–15 cm. (♂) vel 5–10 cm. (♀) longis ; pedunculi 0·5–2 cm. longi ; rhachis angulata, puberula vel glabrescens ; bracteae minutae, caducae ; bracteae involucrales 4, orbiculares, concavae, puberulae ; flores aperti 1 cm. (♂) vel 5 mm. (♀) lati, in umbellulis 4–5 ; perianthii tubus 1·5 mm. longus, lobi 6, ovati, acuminati, 2 mm. (♂) vel 1 mm. (♀) longi. *Stamina* florum ♂ 9–12, vulgo 12, glabra, ordinum I et II 4 mm. longa, antheris oblongis et filamentis gracilibus, ordinum III et IV breviora, glandulis 2 sessilibus vel stipitatis prope basin filamentorum ; ovarii rudimentum 0 vel parvum, conoideum. *Staminodia* florum ♀ 12, glabra, ordinum I et II clavata, 1·5 mm. longa, ordinum III et IV subulata, 1 mm. longa, glandulis 2 magnis

lobatis ad basin. *Ovarium* ovoideum, stylo crasso curvato, stigmate peltato, 2–3-lobo. *Drupa* magna, globosa, paullo depressa, 2·5–3 cm. diametro; juvenilis perianthii tubo incrassato fere inclusa, deinde ad tertiam partem, denique supra cupulam patelliformem rugosam 2·5 cm. diametro insidens; pericarpium crassum, rubrum et maculatum, siccitate flavescens.

Malay Peninsula. Province Wellesley, *Curtis*, 2511. Perak, *Wray*, 2337, 2730; *Scortechini*, 265, 270, 589; *King's Collector*, 3697, 6076, 6124, 6155, 6237, 6409, 6567, 6613, 6689, 6774, 6866, 7204. Selangor: at Dusum Tua, *Ridley*, 7621. Singapore: at Toas, *Ridley*, 6455.

Litsea nidularis, *Gamble* [Lauraceae-Litseeae]; species insignis *L. megacarpae*, Gamble, affinis, racemis glabris brevioribus, foliis minoribus glaucinis oblanceolatis, et drupa in cupula lignosa nidum simulante inclusa differt.

Arbor magna ad 25–30 m. alta, 9–12 dm. trunci diametro; ramuli crassi, pallidi, teretes, siccitate striati. *Folia* coriacea, alterna, glabra, oblanceolata vel elliptico-obovata, apice rotundata et interdum emarginata, basi curvata, attenuata vel rotundata, supra lucida, infra caerulescentia, siccitate glaucina, marginibus magnopere recurvis; 10–25 cm. longa, 4–10 cm. lata; costa modice crassa, supra sulcata; nervi utrinque 10–12, supra impressi, curvati et sub marginem arcuatim juncti; nervuli transversi distantes, saepe ramosi; reticulatio conspicue areolata; petiolus crassus, 15–25 mm. longus. *Flores* in umbellulis pedunculatis distantibus in racemis glabris axillaribus vel lateralibus, 10 cm. (♂) vel 4 cm. (♀) longis; umbellulae apertae, 8–10 mm. (♂) vel 5 mm. (♀) latae, 4–5-florae; bracteae involucrales 4, glabrae, orbiculares, concavae, reflexae; perianthii lobi 6–8 (♂) vel 4–6 (♀) oblongi, acuti vel obtusi, sparse villosi, 3 mm. longi. *Stamina* florum ♂ 12–16, vulgo 12, ordinum I et II 5 mm. longa, antheris subquadratis et filamentis gracilibus sparse villosis, ordinum III et IV. breviora, antheris obovatis et glandulis 2 stipitatis ad basin filamentorum; ovarii rudimentum ovoideum, glabrum. *Staminodia* florum ♀ 9–12, ordinum I et II clavata 1 mm. longa; ordinum III et IV breviora et glandulis 2 orbiculatis stipitatis munitae. *Ovarium* ovoideum, stylo crasso, stigmate peltato. *Drupa* cerea, flava, depresso-globosa, apiculata, 1·4 cm. diametro, 7–8 mm. alta, in perianthii tubo incrassato nidiformi (cupula) fere inclusa; cupula lignosa, marginibus incurvis, ore rotundo 1–1·2 cm. diametro; pedicellus incrassatus, clavatus, complanatus, 1 cm. longus; pericarpium lucidum, laeve.

Malay Peninsula. Penang: Government Hill, 650 m., *Curtis*, 3279. Perak: at 250–300 m. alt., *King's Collector*, 6883; at Hulu Kenat, *Scortechini*, 759.

Litsea sarawacensis, *Gamble* [Lauraceae-Litseeae]; species *L. lancifoliae*, Hook. f., affinis, foliis cuspidato-acuminatis paucinerviis, drupae cupula obconica lobis deciduis nec persistentibus differt.

Arbor parva; ramuli graciles, glabri, ultimi tantum puberuli. *Folia* chartacea, opposita et subopposita; elliptico- vel oblongo-lanceolata, apice cuspidato-acuminata, basi acuta; supra siccitate rubro-fusca, vix lucida, glabra, infra pallida, glabra; 8–14 cm.

longa, 2–4 cm. lata ; costa gracilis, nervi utrinque 5–7 obliqui, marginem versus curvati et inde prominenter arcuatim juncti ; nervuli transversi horizontales ut reticulatio obscuri ; petiolus 5–6 mm. longus. *Flores* in umbellulis gracillime pedunculatis in racemis brevibus axillaribus vel lateralibus circa 5-floris, vix 4 mm. longis ; bracteae involucrales 4, orbiculares, glabrae, concavae, 2 mm. longae ; flores in umbellulis 5, subsessiles ; perianthii tubus brevis, intus dense villosus ; lobi 6, ovati, subacuti, ciliati, 1·5 mm. longi. *Stamina* florum ♂ 9, ordinum I et II filamentis gracilibus parce villosis, ordinis III breviora, glandulis 2 sessilibus prope basin, longe villosa ; ovarii rudimentum minimum vel 0. *Staminodia* florum ♀ non visa. *Drupa* (immatura) ovoidea, apiculata, perianthii tubo glabro incrassato insidens ; tubus margine glaber, teres, lobis deciduis ; pericarpium laeve, nigrescens.

Malay Peninsula. Singapore : in Reservoir woods, *Ridley*, 4817.

Borneo. Sarawak, *Beccari*, 905, 1475, 1708, 1796 ; *Haviland*, 3077, 3646.

Litsea ujongensis, *Gamble* [Lauraceae-Litseeae]; species haud bene cognita, *L. sessiliflorae*, Hook. f., affinis, foliis membranaceo-chartaceis infra caesiis pubescentibus et nervulis transversalibus et reticulatione obscuris distincta.

Arbor parva vel *arbuscula*, ad 6–9 m. alta ; ramuli graciles, ferrugineo-tomentosi. *Folia* membranacea vel chartacea, opposita vel subopposita, oblanceolata, abrupte apice cuspidato-acuminata, basi cuneata vel attenuata, supra lucida, praeter costam et nervos glabra, infra ad nervos ferrugineo-tomentosa et intra nervos caesio-pubescentia ; 12–22 cm. longa, 5–7 cm. lata ; costa parum prominens ; nervi utrinque 10–15 graciles, ad marginem curvati ; nervuli transversi obscuri, sicut reticulatio ; petiolus crassus, brevis, 5–8 mm. longus, ferrugineo-tomentosus. *Flores* in umbellulis subsessilibus in fasciculis brevibus 2–3-floris axillaribus ; perianthii lobi in ♀ circa 1 mm. longi, villosi, in fructu persistentes, ut etiam staminodia glabra linearia. *Staminodia* ordinum I et II 1·5 mm. longa, ordinis III 1 mm. longa, glandulis 2 magnis prope basin. *Flores* ♂ ignoti. *Drupa* ellipsoidea, 1 cm. longa, 8 mm. diametro, in perianthii tubo incrassato insidens ; tubus 4–5 mm. diametro, 3–4 mm. altus cum pedicello incrassato villoso ; pericarpium crustaceum, siccitate nigrum.

Malay Peninsula. Negri Sembilan : in Sungei Ujong, *Ridley's Collectors*, 1904, 1942, 2305, 2316, 5846. Malacca : at Gunong Sedang, etc., *Ridley*, 3172, 5848.

Var. **nervosa**, *Gamble*. *Folia* subsessilia basi rotundata, dense pubescentia, praecipue ad nervos ; nervi, nervuli transversi et reticulatio magis conspicui. *Ovarium* ovoideum, stylo longo, stigmate peltato bilobo.

Malay Peninsula. Perak : Gunong Batu Pateh, lower camp, *Wray*, 1129 ; *Scortechini*, 2097.

Tetradenia mollissima, *Gamble* [Lauraceae - Litseeae] ; species distincta, ut in genere *Actinodaphne* foliis subverticillatis, sed staminodiis 6 tantum, foliis lanceolatis molliter villosis insignis.

Arbor parva ; ramuli modice crassi, grisei, ultimi molliter ferrugineo - villosi ; alabastra perulis villosis suffulta. *Folia*

coriacea, opposita subopposita vel ternatim subverticillata, lanceolata, apice longe acuminata, basi acuta, supra lucida, costa excepta glabra, infra dense et molliter ferrugineo-villosa praecipue ad nervos ; 9–12 cm. longa, 2·5–3·5 cm. lata ; costa media crassa, supra prominens ; costae laterales ad dimidiam partem folii attingentes ; nervi utrinque 3–4, obliqui, supra paullo impressi ; nervuli transversi numerosi, arcuati, obscuri ; reticulatio minute arcolata, sub lente tantum visa ; petiolus crassus, ferrugineo-villosus, 6–8 mm. longus. *Flores* (♀ tantum cogniti) in umbellulis sessilibus densissime ferrugineo-villosis per 1–3 confertis in axillis foliorum vel e ramulis intra nodos superiores ; bracteae involucrales caducissimae ; flores in umbellulis circa 5, pedicellis brevissimis ; perianthii tubus intus sericeo-villosus sicut etiam lobi 4 lanceolati. *Staminodia* 6, ordinum I et II lineari-clavata, 1·5–2 mm. longa, sparse villosa ; ordinis III breviora, glandulis 2 cordatis stipitatis ad basin munita. *Ovarium* ovoideum, glabrum, stylo dense villoso recto, stigmate capitato. *Stamina* et *fructus* ignota.

Malay Peninsula. Perak : at lower camp, Gunong Batu Pateh, 1000 m., *Wray*, 931.

Tetradenia kedahensis, *Gamble* [Lauraceae-Litseeae] ; species etiam facie *Actinodaphnem* referens, a *T. mollissima*, Gamble, differt foliis maturitate glabris et reticulatione prominenter areolata.

Arbor ; ramuli graciles, teretes, ultimi verticillati, dense ferrugineo-villosi. *Folia* coriacea, verticillata, elliptico-lanceolata, apice cuspidato-acuminata, basi attenuata, supra glabra, juniora tantum strigose-villosa, matura glabra, ad margines cartilaginea, recurva ; 6–11 cm. longa, 2–3·5 cm. lata ; costa media gracilis, utrinque prominens, laterales graciles, paullo supra mediam partem foliorum desinentes et inde cum nervis arcuatim junctae ; nervi laterales utrinque 3–5, graciles, oblique ad marginem curvati, et deinde arcuatim juncti ; nervuli tranversi numerosi, obscuri, arcuati ; reticulatio conspicue areolata ; petiolus gracilis, 5–6 mm. longus, pubescens. *Flores* (♂ tantum cogniti) in umbellulis sessilibus dense fasciculatis ex axillis foliorum vel e ramulis intra nodos ; bracteae breves, obtusae ; bracteae involucrales 4 orbiculares, concavae, marginibus ciliatae, extus dense ferrugineo-tomentosae, intus glabrae ; flores in umbelluiis 5 ; pedunculi breviter villosi ; perianthii lobi 4, ovati, obtusi vel acuminati, dense villosi, 1·5–2 mm. longi. *Stamina* 6, ordinum I et II antheris oblongis et filamentis gracilibus glabris, ordinis III breviora, glandulis 2 stipitatis reniformibus ad basin filamentorum ; ovarium rudimentarium ovoideum, sparse villosum, stylo gracili, stigmate capitato. *Staminodia* florum ♀ et *fructus* ignota.

Malay Peninsula. Kedah : on Kedah peak, 900 m., *Ridley*, 3590, 5940.

Lindera Wrayi, *Gamble* [Lauraceae-Laureae] ; species obscura, plus minusve *L. oxyphyllae*, Hook. f., affinis, foliis obovatis longe acuminatis et umbellularum fasciculis paucifloris differt.

Arbor parva ; ramuli modice crassi, nigrescentes ; innovationes ferrugineo-puberuli. *Folia* chartacea vel submembranacea, alterna, obovata vel elliptico-obovata vel -oblanceolata, apice cuspidato-acuminata vel interdum rotundata, basi longe cuneata, supra

glabra, nigrescentia, infra rufescentia ; 10–18 cm. longa, 3–6 cm. lata ; costa gracilis ; nervi utrinque 8–14, supra impressi, curvati et prope marginem arcuatim juncti ; nervuli transversi infra conspicui; reticulatio obscura ; petiolus gracilis, 0·8–1·8 cm. longus. *Flores* in umbellulis gracilibus pedunculatis in racemis brevibus axillaribus vel lateralibus, 7 mm. longis ; pedunculi 5–7 mm. longi ; bracteae involucrales 4, hemisphaericae, glabrae, deciduae ; flores in umbellulis ♂ circa 7, ♀ circa 8 ; pedicelli brevissimi ; perianthii lobi ovati, acuti, 1–2 mm. longi, glabri, in floribus ♀ quam in ♂ paullo breviores. *Stamina* florum ♂ 9, thecis 2, 2 mm. longa, ordinum I et II filamentis gracilibus et antheris obtusis, ordinis III glandulis 2 magnis angulatis paullo supra basin filamentorum ; ovarii rudimentum parvum, conoideum. *Staminodia* florum ♀ minutissima, ordinum I et II lineari-clavata, glabra, ordinis III subulata, glandulis 2 magnis angulatis ad mediam partem filamentorum. *Ovarium* ovoideum, stylo longo crasso curvato, stigmate peltato. *Drupa* (nondum matura) ovoidea, 0·7–1 cm. longa, pedicello incurvato ; pericarpium laeve.

Malay Peninsula. Perak : on Gunong Batu Patch, Gunong Brumbu, Gunong Iras, Gunong Bubu, 1300–2000 m., *Wray*, 399, 1564, 3866, 4149 ; Bujong Malacca, *Ridley*, 9706 ; *Scortechini*.

LIII.—NEW ORCHIDS : DECADE 37.

361. **Eulophia aliwalensis**, *Rolfe* ; affinis *E. transvaalensi*, Rolfe, sepalis longioribus, labello late elliptico differt.

Folia 3–4, fasciculata (immatura), basi vaginis 3–4 latis obtecta. *Scapus* circiter 45 cm. longus, basi vaginis lanceolatis acutis obtectus ; racemus circiter 10 cm. longus, 7–8-florus. *Bracteae* elliptico-ovatae, acutae, 6–8 mm. longae. *Pedicelli* circiter 2 cm. longi. *Flores* mediocres, flavi, externi brunnei. *Sepala* subconniventia, elliptico-oblonga, subacuta, 1·2 cm. longa. *Petala* elliptica, subobtusa, sepalis multo latiora. *Labellum* late ellipticum, 3-lobum, sepalis paullo brevius ; lobi laterales late rotundati ; lobus intermedius suborbicularis ; discus carinis 7–9 valide papillosis instructus, mediis 3 ad basin extensis et vix verrucosis ; calcar gracile, subclavatum, fere strictum, 4 mm. longum. *Columna* late oblonga, 6 mm. longa, apoda.

S. Africa. Elands Hoek : near Aliwal North, on dry flat grassy ground, 1380 m., *Bolus*, 10671.

362. **Eulophia Saundersiae**, *Rolfe* : affinis *E. lissochiloidi*, Lindl., labelli lobo intermedio duplo latiore differt.

Folia non vidi. *Scapus* erectus, vaginis oblongis obtectus ; racemus brevis, circiter 6-florus. *Bracteae* ovatae, breviter acuminatae, 0·8 1·2 cm. longae. *Pedicelli* 2–2·5 cm. longi. *Flores* flavi, brunneo-punctati. *Sepala* patentia, elliptico-oblonga, obtusa vel subapiculata, circiter 2 cm. longa. *Petala* late elliptica, obtusa, sepalis multo breviora et latiora. *Labellum* late ellipticum, petalis

aequale, 3-lobum ; lobi laterales quadrati, obtusi vel truncati, breves ; lobus intermedius late elliptico-oblongus, apice obtusus vel rotundatus, crebre venosus ; discus carinis 7 approximatis verrucosis vel papillosis instructus ; calcar late oblongum, obtusum, strictum vel leviter curvatum, 4 mm. longum. *Columna* late oblonga, 6–8 mm. longa.

S. Africa. Natal, *Mrs. K. Saunders*, 1.

363. **Eulophia Thunbergii**, *Rolfe* ; affinis *E. barbatae*, Spreng., racemis laxioribus et floribus majoribus differt.

Rhizoma validum ; nodi incrassati. *Folia* 3–4, fasciculata, linearia, subacuta, leviter recurva, 8–20 cm. longa, basi vaginis 2–3 brevibus imbricatis obtecta. *Scapi* 20–30 cm. longi, basi vaginis 2–3 lanceolatis obtecti ; racemi 8–13 cm. longi, laxiusculi. *Bracteae* lanceolatae, acuminatae, 1·2–2 cm. longae. *Pedicelli* circiter 2 cm. longi. *Flores* mediocres. *Sepala* lanceolato-attenuata, apice acuminata, 2 cm. longa. *Petala* anguste ovata, subobtusa, sepalis fere duplo latiora. *Labellum* late ovatum, 3-lobum, petalis paullo brevius ; lobi laterales apice rotundati ; lobus intermedius late rotundatus ; discus carinis 5–7 cristatis et verrucosis instructus ; calcar gracile, leviter curvatum, 4 mm. longum. *Columna* clavata, 6 mm. longa.

S. Africa. *Thunberg*.

364. **Eulophia robusta**, *Rolfe* ; affinis *E. Dregeanae*, Lindl., labelli cristis gracilibus et disjectis differt.

Rhizoma validum ; nodi incrassati. *Folia* 4–6, fasciculata, ensiformia vel elongato-linearia, acuta, suberecta vel leviter recurva, 15–30 cm. longa, basi vaginis 2–3 brevibus obtecta. *Scapi* erecti, 25–45 cm. longi, vaginis numerosis lanceolatis leviter imbricatis obtecti ; racemi 8–15 cm. longi, multiflori. *Bracteae* lanceolatae, acuminatae, 1·5–2·5 cm. longae. *Pedicelli* circiter 2 cm. longi. *Flores* majusculi, flavi, vel petala et labellum carnea vel alba, sepala brunnea. *Sepala* oblongo-lanceolata, acuta vel acuminata, 2 cm. longa. *Petala* elliptico-oblonga, obtusa vel subacuta, sepalis aequalia vel longiora et duplo breviora. *Labellum* late ovatum, 3-lobum, petalis paullo brevius ; lobi laterales late rotundati ; lobus intermedius late ellipticus vel rotundatus ; discus carinis 5–7 cristatis vel papillosis instructus, carinis basi verrucosis ; calcar oblongum, crassiusculum, 4 mm. longum. *Columna* late oblonga, 6 mm. longa.

S. Africa. Transvaal : near Heidelberg, 1830 m., *McLea in Herb. Bolus*, 5818, and other localities.

365. **Eulophia Nelsoni**, *Rolfe* : affinis *E. Dregeanae*, Lindl., floribus, multo minoribus differt.

Folia 4–5, fasciculata, anguste linearia, acuta, 8–20 cm. longa. *Scapus* circiter 45 cm. longus, basi vaginis lanceolatis obtectus ; racemi 15 cm. longi, laxi, circiter 8-flori. *Bracteae* lanceolatae, acuminatae, 1·2–2 cm. longae. *Pedicelli* 1·2–2 cm. longi. *Flores* mediocres. *Sepala* lanceolata, acuminata, circiter 1·2 cm. longa. *Petala* anguste ovato-oblonga, apiculata, sepalis fere duplo latiora. *Labellum* profunde 3-lobum ; lobi laterales oblongi, apice obtusi vel rotundati ; lobus intermedius suborbicularis, apiculatus, leviter undulatus ; discus carinis prominenter papillosis instructus, carinis

basi verrucosis ; calcar oblongum, obtusum, crassiusculum, 3 mm. longum. *Columna* clavata, circiter 6 mm. longa, basi in pedem brevem extensa.

S. Africa. Transvaal ; Pretoria district, Wanderwald, *Nelson*, 297.

366. **Eulophia oblonga**, *Rolfe* ; a *E. Dregeana*, Lindl., labelli lobo intermedio oblongo, lobis lateralibus parvis facile distinguenda.

Folia non vidi. *Scapus* crassiusculus, vaginis lanceolatis imbricatis obtectus ; racemus circiter 10 cm. longus, densus, multiflorus. *Bracteae* lanceolatae, anguste acuminatae, 1·2–2 cm. longae. *Pedicelli* 2 cm. longi. *Flores* mediocres, albi. *Sepala* oblongo-lanceolata, acuminata, leviter undulata, 2 cm. longa. *Petala* oblonga vel elliptico-oblonga, subobtusa, undulata, sepalis paullo breviora. *Labellum* oblongum, obtusum, 3-lobum, 2 cm. longum ; lobi laterales oblongi, obtusi, divergentes, 4 mm. longi ; lobus intermedius oblongus, obtusus, 8 mm. longus ; discus copiose barbatus, carinis basi verrucosis ; calcar gracile, obtusum, rectum, 4 mm. longum. *Columna* clavata, 6 mm. longa.

S. Africa. Albany : Nazaar Hills, collector not known.

367. **Eulophia Haygarthii**, *Rolfe* ; a *E. Dregeana*, Lindl., foliis latioribus, floribus majoribus et labello fere duplo latiore differt.

Folia 7–8, fasciculata, late ensiformia vel elongato-lanceolata, apice attenuata et acuta, recurva, 7–22 cm. longa, prominenter 5–7-nervia, basi late vaginata. *Scapi* laterales, 60–75 cm. longi, vaginis lanceolatis numerosis imbricatis obtecti ; racemus 10–15 cm. longus, densiusculus, multiflorus. *Bracteae* lanceolatae, acuminatae, crebre venosae, 1·3–2·5 cm. longae. *Pedicelli* circiter 2 cm. longi. *Flores* majusculi. *Sepala* lanceolata vel oblongo-lanceolata, acuta vel acuminata, 2·5 cm. longa. *Petala* anguste ovata vel elliptico-ovata, acuta, sepalis fere breviora et duplo latiora. *Labellum* late ellipticum, petalis aequilongum, 3-lobum ; lobi laterales late oblongi, obtusi ; lobus intermedius orbicularis ; discus carinis 5–7 papillosis instructus, carinis basi verrucosis ; calcar oblongum, obtusum, 4 mm. longum. *Columna* clavata, 6 mm. longa.

S. Africa. Natal : Camperdown, 600 m., *Wood*, 469. *Haygarth in Herb. Wood*, 1960.

368. **Lycaste lata**, *Rolfe* ; species ex affinitate *L. Barringtoniae*, Lindl., a qua sepalis petalisque multo brevioribus et latioribus differt.

Pseudobulbi oblongo-ellipsoidei, paullo compressi, hexangulares, angulis obtusis, circiter 6·5 cm. longi, 3·5 cm. lati, diphylli. *Folia* petiolata, elliptico-lanceolata, breviter acuminata, plicata, prominenter trinervia, circiter 21 cm. longa, 6 cm. lata ; petiolus circiter 6 cm. longus. *Scapus* brevis, circiter 3 cm. longus, basi vaginis membranaceis obtectus. *Bracteae* ovatae, acuminatae, valde concavae, 3·5 cm. longae. *Pedicelli* 2 cm. longi. *Sepalum* posticum obovato-oblongum, subobtusum, incurvum, 4 cm. longum, fere 2 cm. latum ; sepala lateralia subfalcata, elliptico-oblonga, subobtusa, 3·5 cm. longa, 1·8 cm. lata. *Petala* subspathulata, 3 cm. longa ; limbus suborbiculari-ovatus, subobtusus, fere 2 cm. latus, basi cuneatus. *Labellum* recurvum, obscure-trilobum, elliptico-oblongum,

4 cm. longum, 1·5 cm. latum ; lobus intermedius longe fimbriatus ; callus obovato-oblongus, truncatus, 5-carinatus. *Columna* arcuata, 2 cm. longa ; alae breviter triangulares, subacutae. *Mentum* conicum, 1·5 cm. longum.

Peru. *Forget.*

Flowered with Messrs. Sander & Sons, St. Albans, in November, 1910. The sepals and apex of the petals are green, and the rest of the flower white.

369. **Oncidium (Cimiciferum) Ballii**, *Rolfe ;* habitu *O. murino*, Reichb. f., simile, sed bracteis majoribus, labello oblongo obtuso et callo lato differt.

Pseudobulbi conferti, ovati, compressi, ancipites, 5–6 cm. longi, circiter 3 cm. lati, apice monophylli, basi diphylli. *Folia* oblonga, subobtusa, basi conduplicata, 10–16 cm. longa, 2·5–4 cm. lata. *Scapi* axillares, suberecti, circiter 30 cm. longi, basi vaginis spathaceis adpressis obtecti, supra ramosi ; paniculae strictae, angustae, densae, circiter 17 cm. longae, multiflorae ; ramuli 1–2 cm. longi, basi vaginis lanceolatis obtecti. *Bracteae* ovatae, subobtusae, concavae, 4–5 mm. longae. *Pedicelli* 4–6 mm. longi. *Flores* parvi, numerosi. *Sepala* et *petala* patentia, oblonga vel obovato-oblonga, apiculata, prope apicem subundulata, 6–7 mm. longa, sepala basi angusta. *Labellum* patens, carnosum, subintegrum, deltoideo-oblongum, obtusum, circiter 5 mm. longum, basi valde carnosum, nitidum, breviter et obtuse bicarinatum. *Columna* lata, 3 mm. longa, exalata.

Flowered in the collection of Mr. G. Shorland Ball, Burton, Westmorland, in October, 1908, and at Kew in September, 1910, the latter plant having been presented by Mr. Ball in August, 1909. The flowers are bright yellow, with brown markings on the lower half of the sepals and petals, and the base of the lip darker shining brown.

370. **Sigmatostalix peruviana**, *Rolfe* ; a *S. aurosanguinea*, Reichb. f., sepalis petalisque subaequalibus, labello non mutico differt.

Planta caespitosa, 5–7 cm. alta. *Pseudobulbi* ovoidei vel ovoideo-oblongi, subcompressi, circiter 1·5 cm. longi, basi tetraphylli, apice monophylli. *Folia* linearia, subobtusa vel minute denticulata, basi conduplicata, 3–4·5 cm. longa, 2–3 mm. lata. *Scapi* laterales, graciles, circiter 5 cm. longi, vaginis paucis obtecti, pauciflori. *Bracteae* ovato-oblongae, subobtusae, 3 mm. longae. *Pedicelli* graciles, circiter 4 mm. longi. *Sepala* patentia, oblonga, subobtusa, apice recurva, 3 mm. longa. *Petala* suberecta, oblonga, subobtusa, apice recurva, 3 mm. longa. *Labellum* subsessile, patens, deltoideo-reniforme, obtusum, undulatum, basi angulatum, 4 mm. longum, 5 mm. latum, basi callo 5-lobo nitido instructum. *Columna* clavata, 2 mm. longa ; alae minutae, uncinatae.

Peru. *Forget.*

Flowered with Messrs. Sander & Sons, St. Albans, in November, 1910. The sepals and petals are straw-coloured, the dorsal sepal and petals having a dark purple band at the base, and the lip light-yellow, with a shining orange-yellow crest.

LIV.—A NATIONAL BOTANIC GARDEN FOR SOUTH AFRICA.

Professor H. H. W. Pearson, Professor of Botany in the South African College, Cape Town, has advocated the need for the establishment of a South African National Botanic Garden in his address as President of Section C. of the South African Association for the Advancement of Science.

The meeting of the Association synchronising as it does with the consummation of the Union of South Africa renders the consideration of this question particularly opportune, and there is hardly room for doubt that the able and well-reasoned statements advanced in support of this proposal will receive the careful attention of the Government of South Africa.

Space does not permit the reproduction of the address in its entirety but in view of the interest and importance of the subject to scientific workers outside South Africa as well as to those within the borders of the Union, some of its more salient passages are here reprinted.

Professor Pearson after a few introductory remarks proceeds to consider the general question of a National Botanic Garden.

"It is," he points out, "a subject of such far-reaching importance to a Pastoral and an Agricultural South Africa that I enter upon it with some trepidation lest any ill-considered words of mine should tend rather to hinder than to forward an object with which I am convinced that this Section as a whole will be in full sympathy. The country is so vast, its people so scattered and the interests of different sections of the population in many respects so divergent, that one whose outlook has of necessity been somewhat circumscribed and whose knowledge of the great spaces now united under one Government is somewhat limited, can hardly hope to avoid some of the pitfalls with which this question is beset. But these disabilities may confer at least one advantage: they perhaps prevent me from being overcome at the outset by the magnitude of the difficulties which lie in the way of the achievement of the purpose I am advocating. That this is a real advantage I do not doubt; for the difficulties, great as they may be, will none of them prove insurmountable when we reach them.

"The chief danger of which I am conscious at the outset is that in the attempt to take a broad view of this question, less than justice should be done to the excellent institutions, variously known as 'Public,' 'Municipal' or 'Botanic' Gardens, which are scattered up and down the country. They are all alike in that they have done and are doing very useful work which deserves all the support that they receive. In the Cape Province alone there are twenty such gardens receiving in 1909, Government grants varying from £9 15*s.* to £500, and amounting in all to £1,691. Whatever titles they bear, however, these are not Botanic Gardens in any true sense; the more restricted functions of Municipal Gardens they perform with great credit to their supporters and curators, and no one, in advocating the foundation of a truly National Botanic Garden would wish to see their usefulness impaired. On the contrary, they could not but be strengthened by the establishment of such a National institution.

"The Natal Botanic Garden stands apart from the rest. It has played no small part in the economic development of the province which it serves and from it has emanated taxonomic work of a high scientific value. On its establishment, more than half a century ago, it received an annual grant of £50 from the Government. This was gradually raised to £359. In addition, the Government contributed, in 1909–10, £250 towards the upkeep of the Herbarium and in aid of the publications proceeding from it. The total income of the establishment in 1909–10 was £2,353 14*s.* 6*d.*, of which £1,236 19*s.* 7*d.* was derived from the sale of plants. It follows, therefore, that the proper work of a Botanic Garden has been very largely subordinated to the necessity of maintaining what MacOwan called 'the perpetual fight against insolvency.' But, hampered as its activities have been in this respect as well as by its unsuitable locality, unfruitful soil and restricted space (50 acres), it has consistently striven to fulfil the functions of a Botanic Garden. The measure of success which it has achieved is due to the skill and enthusiasm with which it has been guided for more than 28 years by Mr. Medley Wood, its able and respected Director.

"The oldest of the South African Gardens—the Municipal Garden of Cape Town—was established under the name of a Botanic Garden in 1848. The objects of the founders, as stated on the subscribers' tickets were :—

"1. To introduce from all parts of the globe useful, ornamental and fruit-bearing trees, shrubs, plants, flowers and vegetables, and to promote their distribution and culture throughout Southern Africa.

"2. To afford an acclimating resting-place and depôt for exotics in the course of interchange between the eastern and western hemispheres.

"3. To afford facilities for the study of Botany as a science and in connection with the horticulture and agriculture of the Cape and for training practical gardeners.

"4. To provide, for the recreation and amusement of the public and strangers, a garden with shady walks, arbours, seats, fountains, green-houses and a display of the choicest and most delicate flowers.

"These include some of the important functions of a Botanic Garden as this term is now understood, and the fact that Ludwig Pappe, Karl Zeyher and Peter MacOwan are among those who have controlled its destinies is a sufficient guarantee that a real effort was made to establish here a garden worthy of the name and of the place. And, indeed, the Cape Town Garden has in the past done a great deal in introducing exotic plants into cultivation. But those responsible for its management maintained a long but losing strife against unsuitable locality, poor soil, too limited space, lack of water, inadequate funds and the consequent grinding necessity of making the bulk of the income from the sale of produce. The functions of a Botanic Garden were swamped, and all pretence in this direction was finally abandoned in 1891 when it was taken over by the Municipality. It became, as MacOwan foretold, 'but a town pleasaunce of flowers and shady walks,' and, indeed, it could never have been anything greater. This purpose it fulfils admirably, and it is now, probably more than it ever was before, a credit to the

city and to the Corporation as to its curator, Mr. Ridley, whose skill in carrying out many recent improvements is deserving of all praise.

"Mention should also be made of two experiment stations recently established in the Transvaal. Skinner's Court in Pretoria, brought into cultivation as a forest nursery in 1902, became a garden for the experimental cultivation of economic plants in 1904. A second station of the same kind, with 25 acres under cultivation, was opened at Springbok Flats in the Waterberg district in 1903. Both these are therefore in their infancy, but so far as can be judged from the available published information concerning them, they will perform some of the important functions of a Botanic Garden which have hitherto received little attention in South Africa."

The views of various botanists of note are then given as to the need of a properly constituted Botanic Garden among which some comments taken from the *Kew Bulletin*, 1892, pp. 10–14, on the occasion of the transfer of the Cape Town garden to the Municipality are reproduced.

Professor Pearson next proceeds to discuss what is meant by a Botanic Garden and what would be the numerous and complex functions it might be expected to perform in a country like South Africa—"a country in which the climatic and other factors affecting plant-life are so remarkably diversified; in which the native vegetation is of such exceptional interest; in which so little systematic effort has been expended in the experimental cultivation of native and exotic plants of ascertained or problematic economic value; in which such vast areas are awaiting utilization: in which the pastoral and agricultural pursuits, upon which the real prosperity of the new South Africa depends offer for solution so many problems of far-reaching economic importance.

"The foundation of all botanical investigation, as well as of all these researches into the problems of plant life which fall within the respective provinces of the chemist, the physicist, and the agriculturist, is a knowledge of the native vegetation. We have in South Africa a group of floral regions which are second to none in scientific interest. With the exception of a few areas, which are very small indeed in comparison with the greatness of the country as a whole, none of these has been thoroughly exploited by the plant-collector and the systematic botanist; and our knowledge of the plants of many extensive tracts is still hardly more than embryonic. From our present point of view the truth of these statements does not rest merely upon the fact that there are yet many South African species undescribed and unnamed. To complete the catalogue of South African species, not only of phanerogams but also of cryptograms, is an object eminently worthy of our best endeavours and, indeed, not less than a duty which we owe to ourselves and to the rest of the civilised world: but, when all this is done, we have still to learn the geographical range of each species and to obtain a comprehensive knowledge of the life-conditions which control its existence. This knowledge, full of interest as it would be for the student of plant-geography, also possesses a great practical value. Recent events have shown once more how great is our readiness to credit wild stories of the discovery of untold

mineral wealth, but, on the other hand, we are certainly too prone to believe that many parts of the country are worthless unless they contain marketable minerals. I doubt if such a pessimistic verdict with regard to any large area of the Union Territories is at present founded upon adequate evidence. A very important part of the *data* which alone can justify or controvert such a conclusion is furnished by the native vegetation. For such knowledge of it as we possess we are indebted primarily to the European collectors of the last century and a half, of whose names a South African scientific audience needs no reminder. These men bore the burden and heat of the day in a very real sense, and we who have entered into the fruits of their labours have not given that attention to the completion of their work which the needs of the present, as well as the traditions of the past, clearly demand from us. It is true that botanical exploration has not been allowed to die, but for this we must thank individuals—the few whose names will justly occupy prominent positions in the history of South African Botany, whose work has been ably supported and supplemented by the many working in quiet isolation, seeking and receiving no reward, stimulated only by a keen interest in the plants among which they live, who will, when everything is as it should be, be deemed worthy of greater honour than some whose names are more widely known. But what has been and still is lacking is the concentrated and organised effort which has its inspiration in a National institution. A South African Botanic Garden, established upon a sound basis would place on the front page of its programme the completion of the botanical exploration of the country. In this work it would seek to co-ordinate individual effort to which we already owe so much, with the official enterprise which till now has been almost non-existent. The scientific importance of this undertaking it would be difficult to over-estimate. That practical results would follow can hardly be doubted, but apart from these, an educated community must recognise that it is its duty to know the country in which it lives.

"Closely connected with this subject is the cultivation of indigenous plants. It may fairly be said that no other part of the earth's surface offers so great an array of forms of scientific and horticultural importance which lend themselves to inexpensive and effective treatment in a limited space. More than one of the authorities previously quoted have referred to the lack of interest shown in the native flora. People say, no doubt with much truth, that Cape plants are difficult to grow ; but the fact remains that a large number of them, and these by no means the most attractive, have at one time or another been successfully cultivated in Europe ; even to-day, when Cape plants are somewhat 'out of fashion,' you will find at Kew, at Dahlem and I believe also at Edinburgh, Vienna, and elsewhere in Europe, a greater variety of South African plants than in the gardens of the Cape itself. Hundreds of visitors touch at Cape ports, especially at Cape Town, during the year. They enquire times without number 'Where can we see the Heaths, the Proteas, the Orchids, the succulents, the bulbs and other constituents of the vegetation for which South Africa is famous the world over?' They are told 'You must climb Table

Mountain, wander over the Cape Flats and visit the Karoo, Namaqualand and the East; we fill our gardens with plants, very many of which you can see to better advantage in Europe, the States or Australia; our own vegetation which you are discerning enough to praise is difficult to grow.' The inheritors of one of the most remarkable and most beautiful of existing floras, we take so little interest in it that we have not yet been at the trouble to bring its treasures into cultivation! Such as we do find room for, we grow because the enterprise of European horticulturists has made them popular and, as a rule, we are content to be ignorant that we have but brought them back to their own country. This is surely not in harmony with the traditions of South African patriotism! A tardy recognition of a national duty has given rise to legislation designed to protect some of our more attractive and rarer plants from a threatened extinction, but we cannot stop here. The public taste must be stimulated to a proper appreciation of the æsthetic value of one of the most striking of the products of the country, and our duty as custodians of a unique vegetation—many of whose constituents have already disappeared, and others can with difficulty be saved—must be realised. These objects have been forwarded and to a large extent achieved in other countries by National Botanic Gardens, and a similar institution here, with the prestige of a Government Department, administered on scientific lines and accessible to the public would undoubtedly do much to remove what is at present a national reproach as well as a neglect of what might be an important commercial asset. Anyone who has seen Kew on a summer bank holiday does not need to be told that an institution of this kind is a valuable means of education. . . . .

"Before leaving the subject of the South African indigenous vegetation, attention should be drawn to the need for its study from an economic standpoint. South Africa, a country of Euphorbias, has done no experimental work designed to remove the difficulties which have prevented them from acquiring a commercial value as rubber plants. Of our native fibre-plants, medicinal, resinous, and poison plants, fodder plants, and others, we have very little exact knowledge. Here is a practically untouched field for the activities of a well-organised State department of Botany.

"A collection of plants under cultivation affords opportunities for investigating their structure and life conditions. I need hardly explain that science has not finished with a plant when it has been labelled and placed in a herbarium. In fact, this is only a necessary preliminary to the more intimate study of the living plant. Biologists everywhere are busy with many ramifications of the problem of life, and we are called upon to do our share in widening the boundaries of human knowledge. Investigations of this character very generally necessitate keeping the plants for longer or shorter intervals under close observation. This demands a garden equipped with experimental facilities and staffed by men trained to make use of them. This department of the work of a Botanic Garden is of the greatest scientific importance, and it is therefore incumbent upon a civilised community to foster it, apart from the possibility of any practical results that may emerge. Research is, or should be, undertaken with the single object of discovering truth, regardless of the consequences. These, however, may at any time assume a practical and

economic importance which no one has been less inclined to expect than the investigator himself. When the Abbot of Brunn crossed different varieties of peas in his monastery garden he and those who immediately followed him were so little conscious that his work possessed any practical value that it remained unnoticed, indeed forgotten, for more than thirty years. But within the last decade we have seen the rise of a great and influential school of Biologists, who, starting from the basis established by Mendel, have already shewn that, within certain limits, we have the power to produce new races of animals and plants with a precision almost equal to that of the chemist when he prepares hydrogen by combining zinc with sulphuric acid. The economic consequences thus arising out of Mendel's simple experiments in the early 'sixties' are immense, and their limits are not yet to be defined. Work on these lines is in progress in all parts of the world where there are biologists with the means of conducting suitable experiments. In South Africa, so far as I am aware, no serious efforts have been made in this direction, except in the Transvaal and recently at Robertson, under the Departments of Agriculture. But here is a branch of investigation whose influence upon industry is incalculable. An important part of the work of a National Botanic Garden would be the organisation and carrying on of investigations of this character, primarily, of course, with a view to South African requirements. In so doing, however, it would discharge a wider obligation, for it would bring South Africa into line with the rest of the civilised world.

"The introduction and acclimatisation of useful and ornamental exotics were recognised as an important function of a Botanic Garden when the Cape Town Gardens were established. A good deal has been done in this direction, but still more remains to be accomplished. The introduction of foreign plants into this country has been of a somewhat haphazard character, and much enthusiasm and expense, which might have produced beneficial results have been largely wasted. Many valuable exotics have come into the country, but no one knows what they are nor where they are, and there is not at present in South Africa a single organisation properly equipped for obtaining and furnishing the needful information concerning them, for submitting them to experiment to determine their local value, nor for maintaining a general oversight and direction of enterprise of this nature. It is hardly necessary to say that there is a risk in introducing a new plant from another region. It may prove itself to be a good servant, but there is always a possibility that, if it is not very carefully looked after, it may become a bad master. South Africa has had many opportunities of learning this. In order to eliminate dangers of this kind, and to ensure that the introduction of new plants is carried out with judgment and economy, and that suitable steps are taken to ascertain and to realise the economic value of the introduced plants under South African conditions, a national scientific institution commanding the confidence of the Agricultural community is required.

"It has been stated on a former page that the grazing industry presents for solution many problems which would receive attention from the staff of a Botanic Garden. Space does not allow me to deal with these in detail, but I must lay stress upon one of them—

a problem of the greatest importance to the future welfare of this great industry, and through it to the whole community. I refer to what is usually known as the 'deterioration of the veld.' That the feeding value of the vegetation in those parts of South Africa which have been long settled is decreasing is a general belief. It is not difficult to convince oneself that for certain areas at least this belief is well-founded. It is not too much to say that this is a question of the utmost gravity. Slight changes proceeding unheeded for long periods may produce results which would seem to be altogether incommensurate with the magnitude of the changes themselves. While it might be a comparatively simple matter to arrest the downward progress if proper remedial measures were applied in time, a stage is reached sooner or later when Science is powerless. There can be little doubt that many good grazing grounds have been unconsciously allowed to lapse into desert, and that many more are now moving in the same direction. It is imperative that we should ascertain exactly what is happening in these cases; until we know this we are as helpless as a medical man who is called upon to prescribe for a patient of whose symptoms he is ignorant. All we know at present is that the problem is one of great complexity. Its investigation will almost certainly demand the co-operation of the systematic botanist, the physiologist, the bacteriologist, and the chemist; at least, it is quite certain that it will not be mastered by any one of them alone. It is one of those problems which must engage the combined attention of the staff of a well-equipped Botanic Garden, and which is not likely to be solved until the Government is able to command the services of such a staff.

"Finally, there must be mentioned a subject which is of great interest both to the Agriculturist and the Grazier—viz., that of plant diseases. A large proportion of these are caused directly or indirectly by parasitic fungi. In a country which grows wheat, mealies, grapes and sugar cane, it is sufficiently well-known that some of these entail economic consequences of the most serious order. As a result of the close attention paid to these matters in Europe and America, our knowledge of plant diseases has advanced in recent years with great rapidity. What has South Africa done to cope with the diseases from which its Agriculturists have suffered so much? The Transvaal alone has realised the importance of this question and has appointed as an officer in the Agricultural Department a highly-qualified expert in Mycology, whose work has justified his appointment many times over. With this exception, no South African Government has made adequate provision for this work. The extended department of mycology which will no doubt result from the centralisation of Agricultural administration, would be most suitably and economically attached to the State Botanic Garden—suitably, because the work of the mycologist at many points touches that of the physiologist, the morphologist and the systematist, and each is benefited by the experience and knowledge of the rest; economically, because if the mycologist has a separate department of his own much of the laboratory, greenhouse, and garden space, as well as the library and equipment, must be duplicated.

"I have by no means reached the end of a reasonable catalogue of the activities of a properly organised National Garden, but I have still something to say on another aspect of the question, and cannot spare time to deal further with this one. But I think I have said enough to establish my second proposition—viz., that an abundance of work is awaiting the appearance of such an institution. This work has a strong claim upon a civilised and educated community; much of it is intimately concerned with the prosperity of the country, most of it will remain undone until the Government, realising its importance, supplies the means for doing it." . . . .

Professor Pearson then goes on to consider the question in greater detail and to discuss the ways and means of developing, on practical lines, a scheme such as he has outlined. For the scheme to be complete there must need be a Central Institution with various dependent stations which should follow as a natural growth with the development of the scheme.

"As integral parts of it, there will be: (1) A National Herbarium and Botanical Library; (2) a Museum of Economic Botany; (3) Research Laboratories; (4) Administrative Offices. So much centralisation is absolutely necessary both for administrative and scientific reasons. A good deal of the scientific work will, of course, be done in the field or at one or other of the smaller experimental gardens, but unless the whole system is to be paralysed by incomplete equipment and a diffuseness of purpose which take away all hope of efficiency, there must be for all purposes a common base of operations. As to the Garden itself, it will naturally be larger than any of the others and its functions more comprehensive. In the first place, it will become a school of South African Horticulture—a school in a twofold sense. South Africa has not yet evolved a South African Garden. The National Garden will seek to justify its title; it will gradually discover what can be done with the forms which Nature has so bountifully bestowed upon South Africa, and which have hitherto been so pointedly neglected in the country of their origin. It will teach those who visit it to know their own, and it will become a pleasing object-lesson of the great truth which South Africa has not yet finished learning—that the true springs of her development are within, and not oversea. It will also be a school of South African gardening of another kind, for it will train South African gardeners under South African conditions." . . . .

The question as to the proper site for such a National Garden is one with which competent authorities in South Africa are alone competent of dealing, though one suggestion discussed by Professor Pearson possesses an intrinsic interest which justifies its reproduction here.

"One cannot, however, pass by in silence the suggestion which has been made more than once, that the Groote Schuur estate possesses many striking advantages as a Botanic Garden site. It is historic ground and in the eyes of the public is not merely a perpetual memorial of a great man, but it stands for a great ideal whose realisation would be brought nearer by the influences which would emanate from a National Garden, adequately

equipped to carry out the work which belongs to such an institution. It has been said that the idea of establishing a National University in Groote Schuur is favourably entertained by the Government. If this be so, what could be more appropriate than that these two national institutions, designed to raise the standard of culture and to contribute to the material prosperity of the South African nation, should both be overlooked by the Rhodes Memorial? The direct or indirect association of University and Botanic Garden is nothing new: it has endured for centuries in many European centres of learning. As an aid to education—not merely the acquisition of botanical knowledge—the Botanic Garden is an invaluable asset to a University and, on the other hand, the staff of a University Botanical Department can contribute very effectively to the research work carried on in the Botanic Garden." . . . . .

After dealing with some aspects of the financial questions which the realisation of the proposal would involve, Professor Pearson concludes his address in the following words:—"The economic value of a State Department of Botany organised upon a scientific basis and provided with adequate equipment has been abundantly proved in all other important parts of the Empire, tropical, sub-tropical, and temperate. What is probably the most efficient Botanic Garden at present existing is maintained by the Dutch in Java; and perhaps the most beautiful by the Republic of Brazil at Rio de Janeiro. The occupation of the Philippines by America has immediately resulted in a great development of botanical enterprise in those islands. The continent of Africa is dotted with Gardens maintained, partly or entirely for economic purposes, by Egypt, Germany, Portugal and Great Britain. The accumulated wisdom of the nations has found no other satisfactory means of doing the work for which these gardens are established. If South Africa is to proceed upon what, by common consent, are the soundest and most direct lines in increasing, developing and preserving her agricultural and pastoral resources, she must follow the example set by other nations in the occupation or settlement of new or incompletely known regions.

"Important as the commercial aspect of this question undoubtedly is, South Africa cannot ignore another consideration which does not exist in certain of the cases referred to above, where a new country has no immediate prospect of becoming the permanent home of a people of European origin. The South African Botanic Garden cannot be merely an economic undertaking; it must also be an expression of the intellectual and artistic aspirations of the New Nation whose duty it is to foster the study of the country which it occupies, to encourage a proper appreciation of the rare and beautiful with which Nature has so lavishly endowed it."

LV.—DECADES KEWENSES.

PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATORUM.

DECAS LIX.

581. **Cerastium unalaschkense**, *Takeda* [Caryophyllaceae-Alsineae]; species *C. robusto*, Williams, affinis, a quo differt foliis plus duplo brevioribus, petalis oblanceolatis calycem $\frac{1}{3}$ superantibus nec obovatis calyce fere duplo longioribusque, pedicellis deflexis nec erectis, seminibus majoribus, tuberculis ad marginem quam in disco majoribus, longe-echinatis.

Caulis robustus, ut videtur ultra pedalis, simplex, dissite foliatus, pilis rigidulis ferrugineis eglandulosis patentibus hirsutissimis. *Folia* inferiora ovato-lanceolata, superiora ovata, acuta, utrinque pilis longis rigidis eglandulosis hirsuta. *Dichasium* 3–13-florum; pedicelli crassi, fructiferi omnes excepto centrali erecto-patulo deflexi, calyce subduplo longiores, apice paulo curvati, dense hirsuti; bracteae infimae saepe foliaceae, superiores minores, lanceolatae, herbaceae, hirsutae. *Sepala* lanceolata, acuta, 1 cm. longa, margine scariosa, dorso hirsuta. *Petala* oblanceolata, calycem $\frac{1}{3}$ superantia, quadrante bifida, basi ciliata. *Capsula* calyce duplo longior, recta, dentibus rectis, obtusis. *Semina* compresso-subglobosa, 1·3 mm. longa, nigrescenti-ferruginea, dense tuberculata, ad marginem longe-echinata.——*Cerastium vulgatum* γ. *macrocarpum*, Fenzl in Ledeb. Fl. Ross. i., p. 409.——*Cerastium alpinum* β. *Fischerianum* lus. *macrocarpum*, Regel, Pl. Radd. i., p. 439.

EASTERN SIBERIA. St. Laurence Bay, spec. ex herb. hort. Mus. Petrop. 1837, s. n. *C. rigidi.*

ALEUTIAN ISLANDS. Unalaschka, *Eschscholtz*; *M. W. Harrington*, 1871–72.

As a species named *C. macrocarpum* exists, I have named my plant *C. unalaschkense*. It is quite different from *C. vulgatum* or *C. alpinum* by the characters described above.

582. **Cerastium Wilsonii**, *Takeda* [Caryophyllaceae-Alsineae]; *C. rigido*, Ledeb., affine, sed planta glabrescens, foliis ovalibus abrupte vel subapiculato-acuminatis, sepalis apice leviter bilobis, petalis late-cuneatis, lobis angustatis profunde bifidis, staminibus calycem paulo superantibus, petalisque basi glabris distinguenda.

Perenne. *Caulis* ultrapedalis, glabrescens. *Folia* inferiora spathulata, basin versus valde attenuata, abrupte acuminata, superiora ovalia, subapiculato-acuminata, tenuia, glabra, ad nervis tantum et ad bases pilosula. *Dichasium* multiflorum, ramis longe-pedunculatis, glanduloso-hirsutis; pedicelli subfiliformes, glanduloso-hirsutuli, centrales fructiferi calyce fere quadruplo longiores, erecto-patuli, apice incurvi; bracteae infimae foliaceae, acuminatae, supremae multo minores, subscariosae, parte herbacea pilosae. *Sepala* lanceolata vel late-lanceolata, obtusa, apice leviter biloba, margine scariosa, dorso glanduloso-hirta, circiter 6 mm. longa. *Petala* calycem duplo superantia, late-cuneata, dimidio bifida, lobis anguste ellipticis, acutiusculis, basi glabra. *Stamina* calyce paulo longiora, basi glabra. *Capsula* submatura calycem $\frac{1}{2}$ (demum

duplo ?) superans, paulum curvata, dentibus rectis obtusis. *Semina* subtriangulari-globosa, compressa, ferruginea, dense tuberculata, diametro 1 mm. vel paulo ultra.

Central China. W. Hupeh, *E. H. Wilson*, 259.

583. Indigofera Lacei, *Craib* [Leguminosae-Galegeae] ; affinis *I. nigrescenti*, Kurz, sed ramis albo-tomentellis, racemis folia longe superantibus, bracteis persistentibus, leguminibus glabris longioribus differt.

Suffrutex ad 2 m. altus ; rami sulcati, juventute albo-tomentelli, mox glabri, cortice brunneo. *Folia* petiolis 5 mm. longis suffulta, 7–9 cm. longa ; stipulae filiformes, circiter 6 mm. longae ; foliola circiter 23, opposita, oblongo-elliptica vel elliptica, apice rotundata vel leviter emarginata, mucronata, basi rotundata vel interdum cuneata, ad 1·5 cm. longa et 7 mm. lata, rigide chartacea, margine integro, nervis lateralibus subtus conspicuis intra marginem arcuatis ; petioluli circiter 1 mm. longi ; stipellae minutae, setaceae. *Racemi* axillares, multiflori, pedunculo 2·5 cm. longo suffulti, 17·5–22·5 cm. longi. *Pedicelli* graciles, ad 4 mm. longi ; bracteae persistentes, ad 3 mm. longae, ante anthesin haud conspicuae. *Calyx* 1 mm. longus, dentibus minutis. *Corolla* purpurea, longe exserta, ad 8 mm. longa. *Legumen* vix maturum, glabrum, compressum, apice acutum, ad 3 mm. longum, 2 mm. latum, suturis prominentibus, valvis brunneis reticulatis.

Indo-China. Burma : Maymyo Plateau, 1050 m., *Lace*, 4268.

584. Swainsona Incei, *Price* [Leguminosae-Galegeae] ; species ex affinitate *S. phacifoliae*, T. Muell., sed stylo praeter faciem interiorem pilosam paulo post stigma penicillato-barbato differt, etiam *S. parviflorae*, Benth., comparanda, sed stylo firmo applanato distincta.

Herba annua (an semper ?), pilis albis laxe induta : caulibus rigidis. *Folia* 3- (rarius 2-) juga, cum petiolo 2·5–3·5 cm. longo ad 10 cm. longa, foliolis oblongo-lanceolatis vel anguste lanceolatis acutis vel obtusis vel subemarginatis mucronato-apiculatis leviter hirsutis supra glabrescentibus, stipulis integris e basi ovata caudato-attenuatis. *Racemi* 8–21-flori, ad 12 cm. longi, axillares, longe pedunculati, pedicellis brevibus, bracteolis linearibus paulo a calyce remotis. *Calyx* pilis albis subtomentoso-hirsutus, 5 mm. longus, lobis triangularibus seu lanceolatis-acuminatis tubo aequilongis. *Corolla* caeruleo-violacea, vexillo emarginato 1·5 cm. lato callis nullis, alis carina multo brevioribus, carina obtusa incurva. *Ovarium* sessile, dense villosum. *Stylus* distincte applanatus, firmus, incurvus, praeter faciem interiorem pilosam paulo post stigma penicillato-barbatus. *Fructus* deest.

West Australia. Probably Mt. Sir Samuel, *W. H. Ince*.

585. Rubus (Idaeobatus) adenophorus, *Rolfe* [Rosaceae-Rubeae] ; a *R. chiliadeno*, Focke, caulibus crassissimis, foliis ternatis et racemis brevibus differt.

Caules crassissimi, armati ; ramuli florentes hirti, glandulis stipitatis inaequalibus longis atropurpureis aculeisque sparsis muniti. *Folia* ternata vel supera rarius simplicia ; stipulae e basi petioli enatae, filiformes, hirsutae ; petioli hirti glandulosique, parce aculeati, 3–6 cm. longi ; foliola inaequaliter et duplicato-crenata,

utrinque viridia et hirta ; foliolum terminale cordato-ovatum, subobtusum, interdum sublobatum, 4–7 cm. longum ; foliola lateralia subsessilia, minora. *Racemi* ad apices ramulorum, breves, 3–4 cm. longi, 6–10-flori. *Rachis* cum pedunculis sepalisque hirta glandulisque atropurpureis ornata. *Pedicelli* 0·5–1 cm. longi. *Sepala* triangularia, acuminata, circiter 6 mm. longa, patentia. *Petala* late unguiculata, circiter 5 mm. longa ; limbus late ovato-orbicularis, crenulatus, roseus. *Stamina* numerosissima, 3 mm. longa. *Styli* 3 mm. longi, basi pilosi. *Fructus* 1 cm. lati, nigri, edules ; drupulae parce pilosae, nitidae ; putamen minute rugulosum.

China. *Wilson*, 81.

A very distinct species which flowered at Kew in July, 1910, and fruited a few weeks later. It is allied to *R. chiliadenus*, Focke, and closely resembles it in the development of the glands. That species, however, has slender branches, much more elongated serrate leaflets, which are often quinately pinnate, and a loose paniculate inflorescence. The glandular development much resembles that of the *Glandulosi* of the *R. hirtus* group, as pointed out by Focke, and so strongly developed are the glands in *R. adenophorus* that in the living state the sepals recall a pincushion stuck full of black-headed pins. This glandular development extends to the stems and petioles. The Wilson number quoted is the one under which the plant was received from the Arnold Arboretum.

586. **Alloplectus (Nautilocalyx) Forgetii**, *Sprague* [Gesneriaceae-Cyrtandreae] : affinis *A. Lynchei*, Hook. f., a quo foliis longius petiolatis basi anguste subtruncatis margine crispato, petiolis villosis recedit.

Herba e basi ramosa, circiter 6 dm. alta, caulibus pluribus erectis teretibus carnosis breviter villosis superne 8–9 mm. diametro, internodiis 6–8 cm. longis. *Folia* opposita, lanceolata, breviter acute acuminata, basi anguste subtruncata, 13·5–16·5 cm. longa, 5·5–6·5 cm. lata, margine crispata, crenata, sparse ciliata, subcarnosa, supra nitidula, viridia, glabra nervo medio sparse piloso excepto, nervis impressis, subtus opaca, in utroque latere nervorum purpurata, ceterum pallide viridia, nervis prominentibus, nervo medio breviuscule sparse patule villoso, nervis lateralibus utrinque 11–14 ut venulis appresse pilosis, mesophyllo glabro ; petioli 3·5–5 cm. longi, plano-convexi, villosi praecipue in aciebus. *Cymae* contractae, instar fasciculorum, axillares, sessiles, 6–9-florae, bracteis duabus transversis ascendentibus lanceolatis acutis 1·5–2 cm. longis ciliatis extus sparse pilosis intus glabris ; cymula centralis primum evoluta, 3–4-flora ; cymulae laterales 1–3-florae, basi bracteis duabus antico-posticis suffultae ; pedicelli sub anthesi 1·5–1·8 cm. longi, villosi, demum elongati. *Calyx* zygomorphus ; segmenta libera, ovato-lanceolata, acutiuscule acuminata, basi rotundata, 1·6–1·7 cm. longa, 6·5–7 mm. lata, tenuia, hydathodiis denticulata, sparse ciliata, extus sparse pilosa, intus glabra ; segmentum posticum calcare corollae basi repulsum, valde curvatum. *Corolla* ascendens, pallide flava, dorso calcarata ; tubus calcare incluso 3–3·2 cm. longus, extus crispule villosus, intus antice glaber, postice pilis minutis glanduloso-capitatis indutus, inferne 4·5 mm. diametro, circiter 1 cm. supra basin calcaris ampliatus, abhinc usque ad os 8–9 mm. latus, a dorso usque ad ventrem circiter 7·5 mm. metiens ; calcar amplum, rotundatum, circiter 3 mm. longum ;

lobi patuli, transverse elliptici, 5–6 mm. longi, duo laterales exteriores, extus breviter villosi. *Filamenta* in vaginam postice fissam corollae tubo adnatam connata, superne antheris disjunctis spiraliter torta, antica longiora, vagina antice 5 mm. longa, lateraliter 4 mm. longa. *Antherae* per paria apicibus connectivorum connata, circiter 2·2 mm. longa, connectivo dorso valde incrassato 1·7 mm. longo 0·8 mm. lato, 0·6 mm. ultra loculos prominente, loculis omnino sejunctis parallelis mytiliformibus introrsum per totam longitudinem dehiscentibus, triente inferiore libero. *Disci glandula* unica, postica, 1·5–1·7 mm. alta. *Ovarium* ovoideum, 3 mm. longum, pilis multicellularibus acutissimis breviter villosum, superne purpurascens ; stylus circiter 2 cm. longus, pilis multicellularibus aliis glanduloso-capitatis aliis paucioribus acutissimis patule hirsutus ; stigmatis lobi intus minute glanduloso-pilosi ; placentae ad basin bipartitae, segmentis plano-convexis introrsum (facie convexo) tantum ovuliferis.

Peru. Collected by *Forget* for Messrs. Sander & Sons, St. Albans, by whom a plant was presented to Kew.

A. Forgetii is congeneric with *Centrosolenia bractescens*, Hook. Bot. Mag. t. 4675, *Alloplectus Lynchei*, Hook. f. Bot. Mag. t. 7271, and *Episcia hirtiflora*, Spruce ex Hanst. in Mart. Fl. Bras. vol. viii. pars. 1, p. 402. These species and some others constitute a very natural group which may be regarded either as a distinct genus, *Nautilocalyx*, Linden, or as a section of *Alloplectus* for which the name sect. *Nautilocalyx*, Sprague, may be used. The group differs from *Episcia* in habit, shape of corolla, and in the placental lamellae bearing ovules on the inner surface only.

587. **Pityrodia flexuosa**, *Price* [Verbenaceae-Chloantheae] ; affinis *P. Bartlingii*, Benth., et aliis speciebus sectionis *Chloanthopsis*, Diels ; a ceteris speciebus *Pityrodiae* antheribus haud appendiculatis, ab omnibus ramulis superioribus tenuibus glabrescentibusque, floribus minoribus distinctissima.

Fruticulis ramosus, erectus, omnino albus seu canus, dense lanatus : internodiis superioribus elongatis tenuiter flexuosis brunneo-purpureis glabrescentibus. *Folia* ovato-oblonga, obtusa, sessilia, sed non decurrentia, utrinque alte rugosa, marginibus minute et aequaliter crenata, interdum sparsim floccosa. *Flores* numerosi, in cymas globosus dense albo-lanatas circiter 2·5–3 cm. distante aggregati, parvi, ad 1 cm. longi. *Calyx* fere ad basim divisus, segmentis linearibus 5 mm. longis dorso pilosissimis. *Corolla* 8 mm. longa, bilabiata, lobis patentibus, tubo 5 mm. longo subcylindrico in calyce incluso. *Stamina* exserta, summo tubo orta, antheri ovalibus, loculis parallelis haud appendiculatis. *Ovarium* stylusque admodum albo-tomentosa.

West Australia. *W. H. Ince.*

588. **Scleria Kerrii**, *Turrill* [Cyperaceae - Sclericae] ; affinis *S. Radulae*, Hance et *S. elatae*, Thwaites, ab illa nuce pubescente, foliis haud longe attenuatis, ab hac nuce haud tessellata, foliis latioribus haud longe attenuatis differt.

Rhizoma lignosum, crassum, squamis dissolutis obtectum. *Culmi* robusti, ad 8 dm. alti, glabri, triquetri, foliosi. *Folia* 5–7 ; vaginae trialatae, purpurascentes saltem ad angulos ; laminae late lineares vel lineari-lanceolatae, subacutae, usque ad 22 cm. longae, 2·4 cm. latae, in marginibus scabris, nervis primariis 3, glabrae. *Panicula*

ad 7 cm. longa, 6 cm. lata, densa ; rhachis fere glabra ; bracteae primariae infimae foliaceae, superiores et secundariae 1–4·5 cm. longae, lineares, scabrae. *Spiculae* numerosae, unisexuales, foemineae et masculae in panicula mixtae ; spiculae ♂ 4 mm. longae, 1 mm. latae, ♀ 5–6 mm. longae ; glumae mucronatae, pallescentes, marginibus atrorubris. *Stylus* trifidus, 3 mm. longus, ramis 5 mm. longis. *Discus* trilobatus, 1 mm. altus. *Nux* alba, nitida, ovoideo-globosa, breviter apiculata, minute pubescens, non tessellata.

Indo-China. Siam : Chiengmai, Doi Sootep, *Kerr*, 1239.

589. **Carex plesiocephala**, *Turrill* [Cyperaceae-Caricoideae] ; affinis *C. Delavayi*, Franch., sed spiculis 2 approximatis, bracteis haud vaginantibus, utriculis minoribus dense albo-tomentosis ad angulos non alatis rostris longioribus facile distinguenda.

Rhizoma horizontaliter elongatum, vaginis vetustis in fibrillas nigras solutis dense obtectum. *Culmi* usque ad 35 cm. alti, triquetri, ad angulos scabri, superne pilosi. *Folia* pleraque basalia, culmum saepe aequantia, ad 30 cm. longa, 1 cm. lata, plana, marginibus minute scaberrimis, apice acutissima, glaucescentia. *Spiculae* saepissime 2 (rarius 1) androgynae, approximatae, sessiles, 6–7 mm. longae, 0·5–1 cm. latae, parte ♂ quam ♀ parum longiore ; bracteae haud vaginantes. *Flos* ♂ : squamae lanceolato-ovatae, acutae, 4·5 mm. longae, 1·5 mm. latae, minute pilosae ; stamina 3. *Flos* ♀ : squamae oblongo-ovatae, longe mucronatae, 5 mm. longae, 2 mm. latae, minute pilosae ; utriculi squamas parum superantes, oblique patentes, ovoidei, subtrigoni, 5 mm. longi, 1·3 mm. in diametro, ad angulos non alati, dense albo-tomentosi, in rostrum longiusculum, ore bidentatum attenuati. *Styli* basis incrassata ; stigmata 3. *Nux* ovoidea, acute trigona, faciebus concavis.

Indo-China. Burma : Upper Chindwin District, Vindat, 150 m., *Lace*, 4235 ; Siam : Chiengmai, Doi Sootep, *Kerr*, 1221.

590. **Oxytenanthera Lacei**, *Gamble* [Gramineae - Bambuseae] ; affinis *O. Thwaitesii*, Munro, sed vix scandens, spiculis 2-floris, cataphyllis brevioribus haud ita conspicue auriculatis, et foliis tenuioribus.

Frutex erectus. *Culmi* virides vel viridi-glaucescentes, fistulosi, laxe ad basin fasciculati, ramis foliiferis duris ultimis non fistulosis, ramis floriferis fistulosis vel solidis teretibus. *Cataphylla* culmorum 20–30 cm. longa, 15–20 cm. lata, ad basin 4–6 cm. lata, ad apicem straminea, conspicue striata, dorso in parte superiore dense spinulis nigrescentibus tecta ; lamina subulato-lanceolata, reflexa, 10–30 cm. longa, basi paulla contracta, et inde utrinque auriculis brevibus plicatis fimbriatis instructa ; ligula circa 5 mm. longa, ore longe fimbriata. *Folia* tenuia, pallida, in ramis gracilibus geniculatis fasciculatis alternatim ex nodorum lateribus in ramis foliiferis disposita ; vaginae stramineae, striatae, dorso spinulis albis munitae, ore auriculis longis sparse sed longe-fimbriatis cito deciduis instructae ; laminae 10–20 cm. longae, 1–2 cm. latae, supra scaberrimae, infra pubescentes, marginibus etiam scabris, apice acuminatissimae, basi subcordatae, nervis utrinque 5 infra conspicuis ; ligulae breves, membranaceae, dentatae. *Flores* in culmis floriferis in glomerulis ad nodos ramorum 20–40 cm. longorum ad nodos alternatim

fasciculatorum ; glomeruli circa 2 cm. diametro, ad 10–12 spiculas fertiles cum multis sterilibus minoribus et bracteis paleaceis ferentes ; spiculae 5–7 mm. longae, glaberimae, basi bracteis 1–3 parvis suffultae ; glumae vacuae 2–3, ovatae, mucronatae, inferior 3 mm., superior 4–5 mm. longae ; flores fertiles 2 ; glumae florentes (valvae) ovatae, longe mucronatae, floris inferioris 6 mm. longae, superioris 8 mm. longae ; palea floris inferioris bicarinata, carinis ciliatis, apice marginata, 5-nervis, floris superioris convoluta, glabra, apiculata. *Stamina* purpurea ; juniora subsessilia, libera, vetustiora filamentis in tubum longissimum exsertum coalitis ; antherae lineares, apice mucronatae. *Ovarium* ovato-lanceolatum, in stylum gracilem pubescentem attenuatum. *Caryopsis* ignota.

Indo-China. Burma : Thatone District ; E. of Salwen river, Hlaingbwe Forest Reserve and Melaung, *J. H. Lace*, 4578, 4584.

LVI.—LEPTODERRIS, A NEW GENUS OF LEGUMINOSAE.

S. T. Dunn.

In 1860 Bentham described two leguminous climbing shrubs collected by Heudelot in Senegambia as *Lonchocarpus ? fasciculatus* and *L.* ? *brachyptera*, remarking that they differed from all other species of the genus known to him in their stiff, narrow standard and narrow calyx. These and three more plants of similar habit, and possessing the same peculiarities of floral structure, were included by Baker in the genus *Derris* in his account of the *Leguminosae* in the Flora of Tropical Africa in 1871. Three more have been described since that date, one as a *Lonchocarpus* and two as *Derris*. These eight species and six more, described for the first time in this paper, are distinguishable at a glance from all other species of *Derris*, *Lonchocarpus* and *Millettia* by reason of their conspicuously crowded racemes of narrow flowers.

These genera as at present defined are distinguished with certainty only when quite ripe fruit is available, and as the species referable to them collectively are very numerous but usually unknown in ripe fruit, considerable confusion has resulted. Certain marked types of inflorescence and floral structure are observable among them, and it has been in the matching of flowering specimens with these types that the greater part of the confusion has arisen. It has therefore become a matter of pressing importance that any distinct and self-contained groups distinguishable from all allied ones even in the absence of fruit, should be extricated from these genera and given separate generic status. The present paper represents a step in this direction. These 14 species, which are all African, are so closely allied in the characters of their flowers and inflorescence, and are so distinct from all other known species of those genera even when the ripe fruit is unknown, that they form a compact and uniform generic group, and it is proposed to extricate them from the overburdened genera to which they have been previously referred and to treat them as a new genus under

the name of *Leptoderris*. The fruit is that of *Derris* and the name refers to this fact and to the circumstance that the genus has narrow petals and calyces.

This being a natural and uniform genus as regards the floral and (where known) the fruiting characters, some light is thrown upon the value for purposes of generic segregation, in this part of the Natural Order, of other characters, such as the presence or absence of stipellae and of callosities or auricles at the base of the standard. Both these characters vary considerably in this genus, being in fact, only of importance in distinguishing small groups of species, and appear to be here only of secondary taxonomic importance.

All the species inhabit Western Tropical Africa, with the exception of *L. Kirkii* and *L. Harmsiana* which come from the eastern region and *L. calva* which is a native of Uganda.

By the courtesy of the Director of the Royal Botanic Gardens, Kew, this paper has been prepared in the Kew Herbarium and the specimens referred to are there, with the exception of the fine set of Welwitsch's Angola plants preserved at the British Museum Herbarium, leave to examine which and some other material was kindly given by the Keeper of that Department.

Leptoderris, *Dunn*, gen. nov. [Leguminosae-Dalbergeae] ; affinis *Derrei*, Lour., sed floribus dense nodoso-racemosis, calyce anguste campanulato, vexillo angusto, cymbiformi, haud reflexo differt.

Calyx anguste campanulatus, sericeus, dentibus brevibus 4, uno bidentulato. *Petala* glabra. *Vexillum* anguste oblongum, cymbiforme, erectum vel patens, rigidum, laminae basi plana vel callosoauriculata. *Alae* oblique oblongae, carinae supra unguem leviter adhaerentes. *Carina* parum incurva, petalis dorso cohaerentibus. *Stamina* monadelpha, vexillari basi caeteris soluto autem vexilli ungui plus minusve adhaerente. *Antherae* versatiles. *Ovarium* sessile 2–(1 vel 3) ovulatum, pubescens. *Stylus* filiformis, incurvus ; stigmate parvo terminati. *Legumen* oblongum, planum, membranaceum, indehiscens, stylo terminali ; sutura superiore alata. *Semina* 1–(vel 2) planocompressa.

Frutices scandentes vel raro erecti. *Folia* alterna imparipinnata ; foliolis oppositis saepe retusis. *Flores* in ramis paniculae dense nodoso-racemosi. *Bracteae* parvae caducae ; bracteolae ovatae vel subulatae, parvae.

Species 14, Africae tropicae incolae.

Clavis specierum.

Foliola matura subtus sericea vel saltem in venis tomentosa
  Foliola subtus adpresse argenteo-sericea ... 1. *L. hypargyrea.*
  Foliola subtus tomentosa
    Foliola supra opaca, membranacea, non reticulata
      2. *L. brachyptera.*
    Foliola supra nitentia, coriacea vel chartacea, infra reticulata
      Foliola subsessilia ... ... 3. *L. Goetzei.*
      Foliolorum petioluli 4 mm. vel longiores
        Tomentum calycis paniculaeque longum squarrosum
          4. *L. Kirkii.*

Tomentum breve densum
Nodi floriferi lineares ad 1·2 cm. longi
5. *L. Harmsiana.*

Nodi breves
Foliola acuta ... ... 6. *L. nobilis.*
Foliola obtusa vel retusa
Foliola subtus ubique tomentosa
Foliola apice rotundata ... 7. *L. micrantha.*
Foliola apice retusa, flores 1·2 cm. longi
8. *L. reticulata.*
Foliola subtus in venis tantum tomentosa
Panicula ad apicem ramosa 9. *L. congolensis.*
Panicula inferne tantum ramosa
10. *L. glabrata.*

Foliola matura glabra
Foliola venis 4–5-paribus ... ... 11. *L. fasciculata.*
Foliola venis 7–8-paribus
Flores 8 mm. longi
Foliola parva, 5–6 cm. longa, basi rotundata
12. *L. nyanzae.*
Foliola magna, basi cuneata ... ... 13. *L. calva.*
Flores 1·2 cm. longi ... ... 14. *L. macrothyrsa.*

1. **L. hypargyrea**, *Dunn*; affinis *L. brachypterae*, Dunn, sed foliolis subtus argenteo-pubescentibus ab illo et ceteris generis speciebus differt.

Frutex scandens? ramis et rachidibus foliorum paniculaeque tenuiter tomentosis. *Folia* bijuga, 15–20 cm. longa; foliola late cuneata, apice obtusa vel truncata, apiculata ad 10 cm. longa, chartacea, venis exceptis supra glabra, nitentia, subtus adpresse argenteo-sericea, venis 8-paribus ascendentibus rectis parallelis subtus prominulis; petiolulis 0·8–1 cm. longis, stipellis obscuris vel 0. *Panicula* terminalis, ramis paucis longis. *Flores* dense nodoso-racemosi, nodis 2–5 mm. longis, pedicellis 3 mm. longis. *Calyx* anguste campanulatus, 3 mm. longus, lobis parvis triangularibus 4, sicut pedicellus adpresse sericeus. *Petala* glabra, 8–9 mm. longa. *Vexillum* anguste oblongum, cymbiforme, exauriculatum. *Stamen* vexillare basi liberum vexilli ungui adhaerens. *Ovarium* 2-ovulatum, sericeum.

Derris hypargyrea, Harms MS.

W. Tropical Africa. Kamerun: Bipinde forest, *Zenker.*

2. **L. brachyptera**, *Dunn*. *Lonchocarpus brachypterus*, Benth. in Journ. Linn. Soc. iv. Suppl. (1860), 100; *Derris brachyptera*, Baker in Oliver, Fl. Trop. Afr. ii. (1871), 246; Wildem. in Ann. Mus. Congo, sér. 5, i. (1904), 149; *Pterocarpus brachypterus*, O. Kuntze, Rev. Gen. Pl. i. (1891), 203; *Deguelia brachyptera*, Taub. in Bot. Centralbl. xlvii. (1891), 387.

W. Tropical Africa. Senegambia, *Heudelot*, 828; Congo (fide *Wildem.*); Angola, *Welwitsch*, 1889.

There seems to have been some doubt as to whether the specimens with more coriaceous reticulate leaflets are an older stage of the above, but Welwitsch's beautiful series at the British Museum Herbarium makes it clear that the membranous character of the leaflets of the above species is retained until full maturity.

3. L. Goetzei, *Dunn*. *Derris Goetzei*, Harms in Engl. Jahrb. xxx. (1901), 330.

Central Africa. Nyasa region (fide *Harms*).

The description of this species, specimens of which have not been seen, leaves no doubt that it belongs to this genus, but its relations with *L. brachyptera* are not quite clear. It is provisionally placed next to that species in the key.

4. L. Kirkii, *Dunn;* affinis *L. brachypterae*, Dunn, sed foliolis subcordatis brevi-petiolulatis, rachide foliorum glabra, paniculae tomento laxo distincta.

Frutex scandens. *Folia* bijuga, 25 cm. longa, rachide glaberrima; foliola ovata, apice obtusa vel truncata, basi rotundata subcordata, ad 10 cm. longa, margine revoluto, coriacea, supra glabra nitentia, subtus tenuiter laxe tomentosa, venis 6–8-paribus subtus prominulis; petiolulis 4 mm. longis, stipellis 0. *Panicula* terminalis, ad apicem pauciramosa, ramis rachideque laxe squarrose tomentosis. *Flores* dense nodoso-racemosi, pedicellis 1–2 mm. longis, bracteolis parvis lanceolatis. *Calyx* anguste campanulatus, sicut rami tomentosus, lobis parvis triangularibus 4, 4–5 mm. longus. *Vexillum* anguste oblongum, cymbiforme, bicallosum, fortiter auriculatum, stamini vexillari per totam unguem adhaerens, 1·2 cm. longum. *Ovarium* sericeum, 2-ovulatum.

Derris Kirkii, Dunn MS.

E. Tropical Africa. Zanzibar: Mafia Island, *Kirk*.

5. L. Harmsiana, *Dunn*; affinis *L. brachypterae*, Dunn, sed floribus minoribus nodisque floriferis elongatis distincta.

Frutex scandens?; ramulis foliis in pagina inferiore panicula calycibusque pube brevi densa tomentosa vestitis. *Folia* ad 35 cm. longa, bijuga: foliola obovata, apice rotundata vel truncata, basi obtusa, ad 12 cm. longa, coriacea, supra glabra nitida, venis 5–6-paribus subtus prominulis; petiolulis 5 mm. longis, stipellis persistentibus. *Panicula* terminalis, 30–40 cm. longa, inferne ramosa, nodis floriferis ad 1·2 cm. longis. *Florum* pedicelli 2 mm. longi. *Calyx* anguste campanulatus, 3 mm. longus, dentibus 4 brevibus triangularibus. *Vexilli* lamina oblonga, basi callose sulcata auriculis parvis involutis, cum ungui 9 mm. longa. *Ovarium* sericeum, 1–2-ovulatum.

Derris Harmsiana, Dunn MS.

W. Tropical Africa. Usambara: Derema, *Scheffler*, 170.

6. L. nobilis, *Dunn*. *Derris nobilis*, Welw. ex Baker l.c. 245; Wildem. l.c. 149; *Pterocarpus nobilis*, O. Kuntze l.c. 203; *Deguelia nobilis*, Taub. l.c. 387; Hiern, Cat. Welw. Afr. Pl. i. (1896), 283.

W. Tropical Africa. Congo (fide *Wildem.*); Angola, *Welwitsch*, 1890, 1891; Angola, *Gossweiler*, 1746.

7. L. micrantha, *Dunn;* affinis *L. glabratae*, Dunn, sed foliorum pagina inferiore ubique tomentosa floribusque minoribus siccitate purpureis nec albidis diversa.

Frutex scandens; foliorum pagina superiore petalisque exceptis ubique tomento brevi denso vestita. *Folia* bijuga, ad 15 cm. longa; foliola obovata, apice rotundata, apiculata, basi obtusa vel

truncata, ad 18 cm. longa, chartacea, venis 7-paribus subtus prominulis ; petiolulis 4 mm. longis, stipellis parvis mox deciduis. *Paniculae* ex parte inferiore rami, paucae, longae. *Flores* dense nodoso-racemosi, nodis omnibus parvis 1–3 mm. longis, bracteolis subulatis 1–2 mm. longis. *Calyx* anguste campanulatus, 1–2 mm. longus, lobis 4 parvis triangularibus. *Vexilli* lamina oblongo-lanceolata, exauriculata, cymbiformis. *Carina* in siccitate purpureo-venosa. *Ovarium* 2-ovulatum.

W. Tropical Africa. Lagos : Ijero, *Millen.*

8. L. **reticulata**, *Dunn* ; affinis *L. congolensi*, Dunn, sed foliolis subtus in venis tomentosis reticulatis differt.

Frutex scandens ? ; foliis paniculaeque ? ramis tantum visis. *Folia* bijuga, 20–30 cm. longa ; foliola cuneato-obcordata, apiculata, basi angustata rotundata, 8–12 cm. longa, coriacea, supra glabra nitida, venulis subtus tomentosis reticulatis, venis utrinque 6–8. *Paniculae* rami ad 30 cm. longi. *Flores* dense nodoso-racemosi nodis brevibus, subsessiles, 1·2–1·3 cm. longi, bracteolis parvis ovatis. *Calyx* anguste campanulatus, 4 mm. longus, dense sericeus, lobis 4 late triangularibus. *Vexilli* lamina oblongo-cymbiformis, basi fortiter auriculata, glabra, ceteris petalis paullo brevior. *Ovarium* sericeum, 2-ovulatum.

W. Tropical Africa. West Lagos, *Rowland.*

9. L. **congolensis**, *Dunn*. *Derris congolensis*, Wildem. in Ann. Mus. Congo, ser. 5, i. (1904), 149, t. xxxviii. ; *D. brachyptera*, Wildem. l.c. ser. 3, i. (1901), 73, non Baker.

W. Tropical Africa. Congo, *Chr. Smith*, 51, 62. Herb. Mus. Brit.

10. L. **glabrata**, *Dunn*. *Derris glabrata*, Welw. ex Baker l.c. 244 ; *Pterocarpus glabratus*, O. Kuntze l.c. 203 ; *Deguelia glabrata*, Taub. l.c. 387 ; Hiern l.c. 282.

W. Tropical Africa. Angola, *Welwitsch*, 1888.

11. L. **fasciculata**, *Dunn*. *Lonchocarpus fasciculatus*, Benth. l.c. 100 ; *Derris fasciculata*, Baker l.c. 246.

W. Tropical Africa. Senegambia, *Heudelot*, 693 ; *Chevalier*, 3424. Siera Leone, *Morson*, *Scott Elliot*, 5934, *Smythe*, 24. Kamerun : Bipinde, *Zenker*, 3629.

12. L. **nyanzae**, *Dunn* ; affinis *L. calvae*, Dunn, sed foliolis minoribus basi rotundatis distincta.

Frutex scandens, gummi rubrum exudans ; ramorum adultorum cortice scabro. *Folia* 15–20 cm. longa, 3-juga, petiolulis exceptis glaberrima ; foliola oblongo-obovata, apice rotundata-truncata, basi rotundata, 5–6 cm. longa, chartacea, venis 7–8-paribus ; petiolulis pubescentibus 3–4 mm. longis, stipellis 0. *Panicula* terminalis. *Flores* in ramis dense nodoso-racemosi nodis brevibus, subsessiles, bracteolis duobus minutis suffulti. *Calyx* anguste campanulatus dentibus 4 brevibus late triangularibus, 3–4 mm. longus, dense sericeus. *Vexillum* anguste oblongum, cymbiforme, exauriculatum, 8 mm. longum, glabrum. *Ovarium* sericeum, 2-ovulatum. *Legumen* planum, oblongum, acuminatum, basi obtusum, 8–12 cm. longum, 2–3 cm. latum, margine superiore alato ala 4 mm. lata, membranaceum, tenuiter adpresse rubro-sericeum, venis tenuiter reticulatis. *Semina* 1–2.

Derris nyanzae, Dunn MS.

Central Africa. Victoria Nyanza: Buruma Island, *Bagshawe*, 605. Herb. Mus. Brit.

13. **L. calva**, *Dunn*; affinis *L. macrothyrsus*, Dunn, sed foliolis exstipellatis, floribus tertia parte brevioribus minime bracteolatis distans.

Frutex scandens; ramis foliisque mox glabris. *Folia* 3–4-juga, 30–40 cm. longa; foliola oblongo-ovata, apice rotundata, apiculata, basi acuta, ad 15 cm. longa vix matura, membranacea, glabra, venis utrinque 7–8; petiolulis 5 mm., stipellis 0. *Paniculae* ex parte inferiore rami, paucae longae, brevissime fusco-tomentosae. *Flores* lutei, dense nodoso-racemosi, nodis ad 6 mm. longis, pedicellis 1–2 mm. longis, bracteolis 1 mm. longis ovatis. *Calyx* anguste campanulatus, 2–3 mm. longus, adpresse tomentosus, lobis 4 brevibus triangularibus. *Vexilli* lamina anguste oblonga, exauriculata, cum ungue 7–8 mm. longa. *Ovarium* rubro-sericeum, 2-ovulatum, stylo glabro.

Derris calva, Dunn MS.

E. Tropical Africa. Uganda: Entebbe, about 1200 m., *E. Brown*, 358.

14. **L. macrothyrsa**, *Dunn*; *Lonchocarpus macrothyrsus*, Harms in Engl. Jahrb. xxvi. (1899), 300; *Derris macrothyrsa*, Dunn MS.

W. Tropical Africa. Kamerun: Yaúnde forest region, *Zenker and Staudt*, 573.

LVII.—GARDEN NOTES ON NEW TREES AND SHRUBS.

W. J. Bean.

V. *New Chinese Species.*

Acer griseum, *Pax* [Sapindaceae].

A rather bewildering number of new maples have been found in recent years in North-East Asia, but *A. griseum* is one of the most distinct. It is one of the Acers with trifoliolate leaves—a not very numerous group represented in gardens for a good many years by *A. nikoense*. *A. griseum* is a tree 20 to 40 feet high with woolly young branchlets and a trunk furnished with peeling bark which hangs in large, loose flakes. Mr. Wilson found it in Central China and introduced it for Messrs. Veitch in 1901; a young tree has been kindly presented by them to Kew. The collector says it is the most striking of the trifoliolate maples, because of the fine autumnal red and orange colouring of its leaves, and because of the peeling bark just alluded to. The leaflets are 2 to 2½ inches long, oval-lanceolate, coarsely toothed, the terminal one short-stalked, the lateral ones smaller, sessile and oblique. Fruit with very pubescent nutlets and wings, each of the keys 1¼ inch long, ½ inch wide, the pair forming an angle of 60° to 90°.

Berberis parvifolia, *Sprague* [Berberidaceae].

Among recent additions to cultivated barberries two species from China stand out as very distinct. The one is *B. Wilsonae*, Hemsl.

(see *K.B.*, 1906, p. 151), now becoming well-known in gardens; the other, a close ally, is *B. parvifolia*, described in *K.B.*, 1908, p. 445, from a specimen collected by Mr. Wilson in Western China. The species, however, has been in cultivation at Kew since 1896, in which year unnamed seeds were obtained from St. Petersburg Botanic Garden. It has recently again been raised from seeds of Mr. Wilson's collecting for Harvard University. It is a low, compact, evergreen shrub; leaves glaucous, oblanceolate or narrowly obovate, ½ to 1 inch long, usually entire but occasionally spiny-toothed, produced in the axils of slender three-parted spines ½ to ⅝ inch long; under surface prominently net-veined, apex terminated by a short spine. Flowers pale yellow, borne in axillary clusters of four to six; pedicels ¼ inch long. Fruit globose, of a pale translucent terra-cotta colour. From *B. Wilsonae* it differs in the more glaucous leaves, in the fasciculate inflorescence (in *B. Wilsonae* it is corymbose), and in the colour and shape of the fruit.

Buddleia nivea, *Duthie* [Loganiaceae].

For the discovery and introduction of this distinct species we are indebted to Mr. E. H. Wilson, who, about 1903, found it on mountain slopes in Western Szechuan at altitudes of 7000–8000 feet, and sent home seeds to Messrs. Veitch. It has since flowered in their nursery at Coombe Wood. Wilson collected a further supply during the later expedition on behalf of Harvard University, and by means of seeds presented by that institution to Kew it has been added to our collection. The most distinguishing mark of the plant is the thick woolly covering of the shoot and under surface of the leaf. When the parts are young this tomentum is pure white and very striking. The flowers are purple and produced during August in a cluster of three terminal cylindrical panicles 6 to 8 inches long and 1 to 1½ inches wide, supplemented by smaller ones from slender axillary branches. The upper portion of strong shoots, therefore, becomes a huge branching inflorescence 1½ to 2 feet long. The purple corolla, however, is nearly hidden by the white, woolly calyx. Like the other hardy species of Buddleia this is a shrub of rapid growth. In two years from seed our plants are 6 feet high. The leaves are ovate-lanceolate, 4 to 10 inches long, 1½ to 4 inches wide, serrate.

Clematis nutans, *Royle* [Ranunculaceae].

I first saw this species in the nursery of Messrs. Simon-Louis at Plantières, near Metz, a few years ago growing under the name of *C. Buchaniana*. It was obtained for the Kew collection and for several years past has flowered very prettily. It is a vigorous climber, with angular pubescent stems, and pinnate leaves composed usually of seven or nine leaflets. The leaflets are 3-lobed, coarsely toothed, pale green and pubescent, especially beneath, 1½ to 3 inches long, scarcely as wide. Flowers primrose-yellow, and with a charming fragrance like that of cowslips. They are borne on erect panicles 5 to 9 inches long, the four sepals forming a cernuous campanulate perianth, with the apices recurved. The species flowers continuously from August to October, and the soft beauty of its blossom combined with the sweet odour make it one of the most attractive of hardy plants in autumn. *C. Buchaniana*, D.C.,

with which it is confused, has much thicker leaves and sepals. The stamens, too, differ in being glabrous and attenuated towards the top, those of *C. nutans* being hairy over their whole length.

C. nutans was introduced to France by means of seed sent from the region of Tatien-lu in Szechuan, China. More recently seeds have been collected by Wilson in the same region.

Osmanthus Delavayi, *Franchet* [Oleaceae].

In 1890 some seeds of this shrub were sent from Yunnan by the Abbé Delavay to Mr. Maurice de Vilmorin, who distributed them to various correspondents. But we are told by Mr. de Vilmorin that of all the seeds thus obtained, only one germinated, and this was in the Paris School of Arboriculture at St. Mandé. From the plant so raised a stock was ultimately obtained, and the species has lately been secured from France for the Kew Arboretum. It is an evergreen shrub of low growth with spreading pubescent branches, thickly furnished with small, stiff, leathery leaves of a dark, shining green, ovate or oval, serrate, ½ to 1 inch long. Flowers pure white and charmingly fragrant, produced in terminal clusters. Corolla with a funnel-shaped tube ½ inch long. Fruit roundish-ovoid, blue-black. Mr. de Vilmorin suggests that it will be well adapted for the Rock Garden. It is very distinct from the Osmanthuses of the Aquifolium group in the terminal (instead of axillary) flowers, opening in spring, and in the long-tubed corolla. It promises to be perfectly hardy.

Pistacia chinensis, *Bunge* [Anacardiaceae].

Among some seeds obtained in 1897 from a private collector in Central China were a few unnamed ones from which were raised two young trees. These remained without a name until recognised one day by Mr. E. H. Wilson as *Pistacia chinensis*. Mr. Wilson, in his earlier journeys, had never been able to get good seed of this tree, but had apparently done so during his last one on behalf of Harvard University, as I saw young specimens at the Arnold Arboretum last summer. The Chinese Pistacia is a deciduous tree up to 80 feet in height. Leaves pinnate, with usually 10 or 12 leaflets, occasionally with an odd one. Leaflets ovate-lanceolate, acuminate, 2½ to 3½ inches long, ¾ inch wide, smooth, unequally divided by the midrib. According to Wilson the foliage of Chinese trees changes to a gorgeous crimson before falling and thus a large tree makes a most beautiful picture. The young shoots and leaves are boiled and eaten as a vegetable by the Chinese. Flowers have not been borne by our young trees, which are about 8 feet high, but they appear to have little beauty, being produced in a cluster of panicles near the end of the branch, the male flowers crowded on racemes about 3 inches long, the female ones on laxer ones 7 to 9 inches long. Fruit the size of peppercorns, first red then blue. This species promises to be quite hardy and a good grower. For gardens generally it will prove the most satisfactory of an interesting genus containing the Pistachio, Mastic and Chian Turpentine trees, none of which thrive really well except in the south-western counties of the British Isles.

By the kind permission of Professor Sargent, Arnold Arboretum, Harvard University, the photograph of this tree, taken by Mr. E.

H. Wilson in China, is reproduced on the accompanying plate. The illustration shows the young shoots in the condition in which they are eaten by the Chinese.

Sarcococca ruscifolia, *Stapf* [Euphorbiaceae-Buxeae] ; species nova a *S. pruniformi*, Lindl., quacum confusa foliis ovatis acutissimis diametro maximo longitudinis dimidium aequante vel paulo superante distincta.

Frutex humilis ; ramulis novellis tenuiter pubescentibus viridibus. *Folia* ovata, basi rotundata, a medio in apicem acutissimum saepe subpungentem sensim attenuata, 3–5 cm. longa, 1·5–2·5 cm. lata, glabra, superne saturate viridia, subcoriacea ; petiolus 3–5 mm. longus, canaliculatus. *Florum* glomeruli circiter 4- (rarius pluri-) flori, ante anthesin nutantes ; bracteae ovatae, acutae. *Perianthii* ♂ sepala 4, late ovato-elliptica, obtusiuscula, minute ciliolata, 3 mm. longa. *Stamina* 4 vel 5, filamentis ad 6 mm. longis, antheris minute apiculatis. *Perianthii* ♀ sepala 6, ovata, angustiora quam in ♂, acuta, minute ciliolata, 2 mm. longa vel paululo longiora ; stigmata 3. *Fructus* subglobosus, 7–8 mm. diametro.

China. Hupeh : Nanto and mountains to northward, *Henry*, 2588, 2589, 2993, 3077, 3287, 3832.

Mr. A. Henry appears to have been the first to discover this interesting and pretty shrub in the neighbourhood of Ichang, Central China, about 1887. It was introduced to cultivation by Mr. Wilson from the same neighbourhood in 1901 for Messrs. Veitch, and has since been grown in the Coombe Wood nursery whence it has been obtained for the Kew collection. It is an evergreen of neat habit, 1 to 2 feet high, renewing itself by new shoots springing direct from the ground after the manner of Butcher's broom. The stems when young are covered with a minute pubescence. Leaves alternate, entire, ovate or oval, acuminate, 1½ to 2½ inches long, ½ to 1¼ inches wide, of a very dark burnished green and perfectly glabrous ; petiole about ⅛ inch long. Flowers milky-white, very fragrant, produced from October to February in small axillary clusters.

The plant will thrive in shady situations or under trees. Easily increased by cuttings.

VI. *American Shrubs and Trees.*

Fothergilla major, *Lodd.* [Hamamelidaceae] (*F. alnifolia* var. *major*, Bot. Mag. t. 1342).

Although to the present generation of arboriculturists this shrub is perfectly new, it is anything but new to English gardens, for it was cultivated as long ago as 1780. For the greater part of the nineteenth century it was lost to gardens, but thanks to the Arnold Arboretum, it was re-introduced to cultivation from the Alleghany Mountains and was sent to Kew by Professor Sargent in 1902. It can be propagated fairly easily by cuttings and a stock has now been obtained. The illustration gives a very good idea of this Fothergilla in blossom. The plant from which it was made is growing in the Arnold Arboretum and is about 8 feet high. The flowers are produced in May on erect cylindrical spikes 1 to 2

PISTACIA CHINENSIS.

[*To face page* 394.

FOTHERGILLA MAJOR.

To face page 395.]

inches long. They have no petals and the inflorescence owes its beauty to the numerous clustered stamens, the filaments of which are pinkish-white, $\frac{3}{4}$ inch long, and the anthers yellow. Leaves roundish-oval, 2 to 4 inches long, stellately hairy beneath.

Like most of the Hamamelidaceae this Fothergilla possesses distinction and an unusual order of beauty, and it seems remarkable that so striking a plant should have been allowed to disappear from gardens for so long. When young the plant is benefited by having a little peat placed about its roots.

Pterocarya Rehderiana, *C. K. Schneider* [Juglandaceae].

One of the most interesting trees noted during my visit to the Arnold Arboretum, Mass., last summer, was a group of this hybrid Pterocarya. The trees are about 40 feet high and produce suckers freely from the roots. So strong is this sucker-producing habit that, given sufficient space, a single tree would apparently form a little grove of itself. Professor Sargent, who recently presented young plants to Kew, says that it thrives better and is hardier in the Arnold Arboretum, than either of its supposed parents—*P. caucasica* and *P. stenoptera*. This hybrid was raised in the Arnold Arboretum from seeds received in 1879 from the late Mr. A. Lavallée's collection at Segrez where trees of both the parent species are still (or were a few years ago) growing in close proximity. *P. caucasica* is well known in the British Isles and several fine examples exist, notably at Claremont in Surrey and Melbury in Dorset. The hybrid differs from it in having narrow wings to the leaf rachis, but these wings are not so much developed as in *P. stenoptera*. In most other respects it is intermediate between the two. It promises to be an ornamental and effective addition to our pinnate-leaved trees and, like many hybrids, possesses apparently a vigour superior to that of its parents.

VII. *A New Heath.*

Erica arborea var. alpina, [Ericaceae].

Although a somewhat tender species and occasionally destroyed by frost the typical *Erica arborea* is well known in gardens. According to Aiton it was introduced from the South of Europe in 1658. In 1899, the var. *alpina* was acquired for the Kew collection, and this, so far as I can ascertain, was its first introduction to cultivation. Compared with the ordinary *E. arborea*, it is a sturdier bush with stiffer, more erect branches, and altogether more compact. The young shoots are covered (like the type) with an abundance of branched hairs which, under the lens, give them quite a mossy appearance. The flowers are tiny, but very numerous, of a rather dull white, and produced in spring in stiff, pyramidal panicles 1 foot or more long. The great charm of this variety, however, is the cheerful vivid green of its plume-like branches all through the winter. No frost since 1899 has affected it in the least. During the exceptionally trying winter of 1908–9 not even the smallest twig was injured. It is now 6 or 7 feet high in the Kew Arboretum, where several broad masses are to be seen. Of course a frost more severe than any experienced during the last decade may ultimately injure or kill it, but so far as one can judge at

present, it is one of the best evergreens for winter effect introduced for some time. It is a native of the mountains of Cuenca in Spain, at about 4500 feet altitude.

Explanation of Plates.

Pistacia chinensis, tree 80 feet × 12 feet, male ; near the city of Wan Hsien, Yangtsze River.

Fothergilla major, plant about 8 feet high growing in the Arnold Arboretum.

LVIII.—MISCELLANEOUS NOTES.

His Majesty the King has been graciously pleased to confide to Kew, for exhibition on loan, the model of the **Taitokuin Shrine** presented to His Majesty at the close of the Japan-British Exhibition.

The model has been placed in Museum No. III. It consists of two buildings united by a covered way standing in a courtyard surrounded by a fence. A gateway in this fence gives admission to the courtyard and the buildings are entered by a flight of steps beneath an elaborate portico. The model is on a large table, the whole measuring 22 feet 6 inches in breadth, and rises to a height of 8 feet.

Some details of the original shrine are given in the official account of Tokyo, compiled by the Tokyo Municipal Office for the Japan-British Exhibition, from which the following particulars are taken, and Mr. Yamasaki—under whose direction the model has been placed in position at Kew—has also kindly supplied some additional information.

The Taitokuin, which stands at Shiba Park, Tokyo, is the mausoleum of the second Shogun, Tokugawa Hidetada. The shrine or mausoleum along with another shrine at Nikko, dedicated to the first Shogun, Iyeyashu, are considered to be the two most magnificent edifices ever built during the fifteen generations of the Tokugawa Shoguns, covering a period of about 200 years. The shrine at Nikko, in the province of Shimotsuke, is an imposing structure and is much visited by tourists, but the shrine of the second Shogun, the subject of the model, unfortunately escapes the notice of a considerable number.

The architecture of the Tokugawa era (or the Edo era as the historians would call it) is not distinguished so much for its sublimity and grandeur as for its minute and elaborate workmanship. Much attention was paid to Ki-wari-ho, or the cutting of wood, and to Eyo, or the art of painting and decoration. In fact, it may be called the Rococo style of Japanese architecture. By blending the style used for building temples with that used for the erection of shrines, a new kind of edifice came in vogue in this Period which may be called the "Gongen Style." The shrine at Nikko and this mausoleum are the most remarkable specimens of this new style. The buildings were constructed in 1632 by the order of Iyemitsu, the third Shogun. In construction and proportion the buildings bear close resemblance to Buddhist temples. The Front Gate

(called Vermilion Gate on account of its being painted with vermilion) stands at the foremost position. Entering this gate one comes to the Chokugaku-Mon, or the gate bearing a tablet written in it by an Emperor.

Passing through this he finds two well-houses for purifying hands, one located on each side. Then he comes to the Karamon, or Middle Gate. Beyond this gate, he sees the main buildings comprising three edifices of the Haiden, or Hall of Worship, the Ishinoma, or Hall of Stone, *i.e.* the Side Hall, and the Honden, or Main Hall. This group of the buildings which compose the mausoleum is called the House of Spirit. The Main Hall is in every way like the building of Buddhist temples in construction, double rafters being used. A statue representing the second Shogun is placed in the innermost part of the hall incased in a little shrine. The real tomb is situated on a hillock, a little way behind the sacred buildings. It is one mass of beauty and splendour, the best art of both engraving and sculpture being lavished upon it.

The miniature in question represents the House of Spirit consisting of the three halls, enclosed within the Middle Gate reduced to one-tenth of the original size. The best carpenters, sculptors, goldsmiths, and painters were employed in its construction and ornamentation. In measurement and proportion, exactness has been aimed at, and it has been executed with the same painstaking care as if the very mausoleum were to be reconstructed. The minute details have been followed throughout and even the most insignificant parts have not been overlooked, since the internal structure, ceiling, furniture, &c. have been completed with the same minute care as the exterior; it is, therefore, a matter of regret that a perfect view of the interior cannot be obtained.

The work was commenced in the middle of August and completed towards the end of December last year, the average number of workmen employed amounting to 150 per month.

The original gravel was collected and sent from Kishu, a south-western province lying several hundreds of miles from Tokyo. The pebbles used for the model were obtained from Oshima, an island outlying the Bay of Tokyo, on account of their striking similarity to the original.

Ginkgo biloba.—H.M. The King of Italy has graciously presented to Kew a large consignment of ripe seeds of *Ginkgo biloba* from the trees in the Quirinal Gardens.

Botanical Magazine for December.—The plants figured are *Pinus Armandii*, Franch. (t. 8347); *Neoglaziovia concolor*, C. H. Wright (t. 8348); *Corylopsis Veitchiana*, Bean (t. 8349); *Jacobinia suberecta*, André (t. 8350); and *Dendrobium Sanderae*, Rolfe (t. 8351).

The *Pinus* is a native of South-western China and has been introduced into cultivation by Mr. Augustine Henry, who sent

seeds of it to Kew in 1897. Plants raised from these seeds have now reached a height of from 10 to 15 feet. The species has long leaves in tufts of 5 and resembles in general aspect the Bhutan Pine (*P. excelsa*, Wall.), but its cones are very different. *Neoglaziovia* is a small Brazilian genus of *Bromeliaceae* nearly allied to *Dyckia*. *N. concolor* is a new species the leaves of which, like those of the only other species, *N. variegata*, Mez, furnish a strong fibre. Living plants of both species were received from the Imperial Institute in 1903, and from one of these, which flowered for the first time at Kew in 1909, the material for the figure was obtained. It is distinguished from *N. variegata* by its white lepidote leaves. The *Corylopsis* is a new species differing from *C. sinensis*, Hemsl., in having the mature leaves quite glabrous, the stamens distinctly exserted, and red-brown instead of yellow anthers; and from *C. Henryi*, Hemsl., in having more rounded petals and very much shorter calyx-lobes. The figure was prepared from material supplied by a plant which flowered in the Coombe Wood Nursery of Messrs. J. Veitch & Sons, who raised it from seed received from Western Hupeh in 1900. *Jacobinia suberecta*, a Uruguayan species, was first introduced into cultivation in 1899 by Mr. J. Sallier of Neuilly-sur-Seine. The specimen figured was communicated by Col. R. H. Beddome of West Hill, Putney. The plant has broad grey-green leaves and bright scarlet flowers about $1\frac{3}{4}$ inches long. The recently introduced *Dendrobium Sanderae* is most nearly allied to *D. Dearei*, Reichb. f, from which it is distinguished by having larger flowers, marked on the side lobes and base of the lip with purple stripes. The Kew plant from which the drawing was prepared was presented by Messrs F. Sander & Sons of St. Albans, who introduced the species in 1909 from an unrecorded locality in South-eastern Asia.

The volume of the Botanical Magazine completed by this number is dedicated to Harry J. Veitch, Esq., F.L.S., V.M.H.

Yeheb.—A further consignment of Yeheb nuts (*Cordeauxia edulis*, Hemsl.), has been recently received from Somaliland through Dr. Drake Brockman, who has been long associated with the search for Yeheb. The seeds have been distributed to stations in the dry regions of India and elsewhere in the hope that it may be possible to establish the plant in places where the nuts might form a source of food as they do among the Somalis. The original account of the Yeheb plant was published in the *Kew Bulletin* for 1908, pp. 36–44, and in a later note (*K.B.* 1908, p. 141) a hope was expressed that information as to the subsoil, &c., might be forthcoming. This hope, as regards the soil, has been realised owing to the kindness of Capt. Cordeaux, and Kew is very greatly indebted both to him and to Dr. Drake Brockman for their persistent efforts to obtain seeds and general information about the plant in the face of considerable difficulties.

Capt. Cordeaux in sending two samples of soil informs us that one was taken from the surface round the bush, and another from the roots underground; the surface soil appears to be mainly fine

sand coloured by the very dark red subsoil. He adds "the men who brought in the soil say that the soil in which the roots of the bush are found is *always moist* though the surface is dry."

Dr. Voelcker has kindly examined the soil and from the details given below it will be seen that the successful cultivation of the plant should not depend upon richness of the soil. The poverty of nitrogen in the soil is one of its features, but this defect is probably made good by the fixation of atmospheric nitrogen by the plant.

The detailed results of the analyses of the soils are as follows :—

"Soils dried at 212° C.

	Surface soil.	Underground.
Organic matter and loss on heating	·15	·62
Oxide of iron	·83	1·34
Alumina	·56	1·89
Lime	·13	·17
Magnesia	·36	·30
Potash	·06	·21
Soda...	·09	·16
Phosphoric acid	·006	·012
Siliceous matters	97·81	95·30
	100·00	100·00
Nitrogen	·011	·026

"The surface soil was of a bright red colour, and appeared to be little more than coarse sand or grit, with total absence of clay. The sub-soil was of a deeper and darker red colour, but, otherwise, much like the top-soil except that it was finer in character and seemed, possibly, to have a little clay with the sand.

"The analyses bring out nothing but the very poor character of the soils ; the surface soil is nearly destitute of vegetable matter and of nitrogen ; it has but very little lime, a mere trace of phosphoric acid, and very little more potash. In no sense could it be called a fertile soil ; on the other hand, it is just a poor sand. The colour of the soil led me to expect the presence of a considerable amount of iron, but this did not prove to be the case, and the soil has practically no clay—as the analysis shows, close on 98 per cent. was siliceous matter.

"The 'underground,' or sub-soil, was richer in elements of fertility than the surface soil, but even it could only be described as a very poor soil, over 95 per cent. consisting of siliceous matter. There is a certain amount of clay in it, but it is very deficient in vegetable matter and in nitrogen. It is also richer than the surface soil in lime, phosphoric acid and potash, though even in this case the amounts are only such as would lead one to consider the soil as agriculturally very poor.

"I cannot think, therefore, from the analyses I have made, that the soils—either of them—possess such elements of fertility as would be specially related to the growth of this particular plant. In other words, I do not think that there is any particular connection between the growth of the Yeheb plant and the constituents which the soils supply, such connection, at least, as would indicate

what the plant specially requires to be supplied to it in the soil. If the Yeheb plant grows well in the soils indicated by the foregoing analyses, it is not because of the richness of the soil; it may possibly be because of its poverty."

At Kew, Yeheb seedlings have been raised in ordinary soil under moist tropical conditions. The plants have been found to be very slow in growth; a few have flowered but no seeds have been ripened.

Begonia Martiana var. grandiflora.—The publication of a figure of this handsome Begonia in the July issue of the Botanical Magazine (t. 8322)—*K.B.*, 1910, p. 201—has elicited from Messrs. V. Lemoine et fils a note as to its origin and history (Gard. Chron., 1910, vol. xlviii., p. 64). A Mexican Begonia was found in the province of Colima by Roezl, who sent it to Mr. Ortgies, Director of the Botanic Garden at Zurich, and it was put into commerce at the commencement of the year 1877 by Messrs. Lemoine, under the name of *B. racemiflora.* This Begonia was crossed by Messrs. Lemoine with *B. diversifolia*, yielding an improved plant, which was sent out in 1882 under the name of *B. racemiflora rosea grandiflora.* In the same year (1882) Messrs. Lemoine put into commerce, under the name of *B. Martiana gracilis*, a plant found by Dr. Parry near San Luis de Potosi, Mexico, and sent to Mr. Max Leichtlin, of Baden-Baden. This *B. Martiana gracilis* was crossed with *B. racemiflora rosea grandiflora* by Messrs. Lemoine, producing a plant which was distributed in 1885 under the name of *B. Martiana grandiflora*, the plant figured in the Botanical Magazine. None of these facts are mentioned by the author of the note and figure in the Illustration Horticole (ser. vi., ii., p. 98, fig. 14), and possibly they were unknown to him. Two other hybrids are mentioned, which are not concerned in the ancestry of the present plant. It now remains to trace the histories of the plants mentioned.

Begonia racemiflora does not appear to have ever been described and there is no reference to it in the Index Kewensis. It is, however, mentioned by Fournier (Journ. Soc. d'Hort. de France, 1879, p. 202) as "*B. racemiflora*, Ortgies, in Lem. Cat. Janv. 1877, no. 75, p. 7," an imperfectly known Mexican species which will not hybridise with the tuberous Begonias. Messrs. Lemoine now speak of it as having flowers of moderate size, white or with rose tint, developed in axillary bunches that show themselves all on the same side of the inflorescence. They also add that the species is lost to cultivation, as well as the first hybrids raised by them from it. The characters mentioned suggest that it may be the plant known in gardens as *B. Martiana* var. *racemiflora.*

The *B. diversifolia* mentioned is probably *B. diversifolia*, Grah. in Edinb. New Phil. Journ. vol. viii. (1829), p. 183; Bot. Mag. t. 2966; which is the *B. gracilis var. diversifolia*, A. DC.

B. Martiana gracilis is figured in colour (Rev. Hort. 1883, p. 372, with plate), and is much like a stout form of *B. Martiana*, Link and Otto, or possibly the nearly allied *B. bulbifera*, Link and Otto, which De Candolle retains as distinct.

It would thus appear that *B. Martiana grandiflora* is not simply a variety, as was inferred from the name, but a plant which has arisen from the intercrossing of three closely allied forms, which might account for its superior vigour and the increased size of the flowers. It is, however, probable that De Candolle would have regarded all three as varieties of a single species.

When the article for the Botanical Magazine was written, the original *B. gracilis*, Kunth, had not been seen and the opinion expressed as to its distinctness was based upon an examination of specimens collected by Pringle near Guadalajara, State of Jalisco (nos. 2456, 11,452), and distributed as *B. gracilis*, H. B. K., which, however, prove different. Kunth's original type was a specimen collected near Pascuaro, Mexico, by Bonpland, which is preserved in the Paris Herbarium, of which a tracing has now been kindly sent, and which agrees substantially with *B. Martiana*, Link and Otto (Ic. Pl. Rar. Hort. Berol., p. 49, t. 25). This leaves the determination of the specimens collected by Pringle uncertain. As formerly pointed out, they have more slender, never strictly erect stems, with more divided leaves, and a different inflorescence. They may be shade-grown specimens of the species, but further materials are necessary, and a careful comparison with all the allied species, some of which are very imperfectly known, before deciding whether they are really distinct.

R. A. R.

Bitter Pit of Apples.—The disease of Apples known as "Bitter Pit," has already received attention at Kew (*K.B.* 1906, p. 193; 1907, pp. 142 and 250). Though known in Europe and America it is in Australia and South Africa that it is most prevalent. In the latter country it is, perhaps, the most serious trouble with which the Apple-grower has to contend.

Two important communications on the subject have recently appeared. Mr. I. B. Pole Evans, Plant Pathologist to the Transvaal Government, publishes the results of his investigations as to the nature and cause of the disease (Transvaal Dept. Agric., Technical Bulletin, no. 1, 1909); and Mr. Charles P. Lounsbury, Entomologist to the Cape Government, gives a full general account, furnishing particulars as to the varieties attacked, and other details useful for practical purposes (Agric. Journ. Cape of Good Hope, xxxvii. 1910, p. 150).

Pole Evans shows that the spots arise in connection with the vascular bundles, and that the starch, which is well known to be present, is part of the original starch and not a secondary product. He believes that the main factors responsible for the spotting are excessive transpiration during the day followed by its sudden checking and complete abeyance during the night, when root action is still vigorous owing to the warmness of the soil. Under these circumstances, water-accumulation in the cells of the fruit takes place to such an extent, that actual bursting of the cells may occur. When this is the case atmospheric oxygen gains access to the cell, and together with the enzymes present, acts on the tannin, producing dark-coloured oxy-compounds, which are precipitated on the walls as a gummy substance, and diastatic action is inhibited.

The neighbouring cells are also affected, and a nest of unhealthy dried cells is the result.

The author concludes that the South African climate is unsuitable for introduced varieties, and urges the necessity of a new stock of home-grown seedlings. The bulletin contains a full bibliography of the literature on Bitter Pit (some 18 papers), and also a short general and historical account.

Lounsbury's contribution brings together for the benefit of the Cape fruit-grower a collection of data that he has obtained from various sources. He is inclined to believe that Bitter Pit is not always brought about by the same cause; but he accepts the explanation given by Pole Evans for its occurrence in South Africa. The paper then treats of questions of storage, stocks, varieties, irrigation, manuring and pruning. An account is also given of the susceptibility of varieties in other continents, being the substance of replies to letters addressed to various fruit experts. This is followed by numerous tables giving the result of South African experience.

In conclusion, it is suggested that fruit-growers should give more attention to varieties which have originated in South Africa. At the same time, owing to their greater number, Apples raised in other continents offer a far larger selection, and the author believes, that among these varieties, some could be found which would be suitable for South African cultivation.

A. D. C.

Forestry in New Zealand.—The Department of Lands, New Zealand, has recently issued its report on "State Nurseries and Plantations" for the year ending March 31st, 1910.

This report is of an interesting character and consists of 38 pages of text and six pages of illustrations. It is prefaced with a review, by the Under-Secretary of Lands, of the work accomplished since the formation of the Forestry Branch of his Department, in 1896, and contains the combined reports of the superintending nurserymen and plantation foremen for the past year.

The Forestry Branch appears to be very well organised, and the report is presented in such a manner that each detail of its work is made perfectly clear to anyone who has a knowledge of forestry.

Since the establishment of forestry operations in 1896, 14,831 acres have been planted and much additional land is in course of preparation. This area is divided into nine plantations which are fed by five nurseries. Two of the nurseries and three of the plantations are situated in the North Island and the remainder in the South Island. A general superintending nurseryman is in charge in each island, and each plantation and nursery is in charge of a plantation foreman.

The reports of the various nurserymen and foremen deal with local peculiarities of land, culture, and climate, a table being appended in each instance showing the average monthly rainfall and maximum and minimum temperatures. Full details are given in every case of the cost of upkeep, whilst lists of the number of each kind of tree to be found in each nursery, with their approximate value, are also given.

Since 1896, 76,757,658 trees, of an estimated value of £140,777, have been raised in the nurseries, whilst 50,545,775 trees have been removed to permanent positions in plantations, shelter belts, and elsewhere.

In each district sufficient labourers are kept for the regular work and extra ones are engaged for planting. In the neighbourhood of prison settlements prisoners are utilised for planting operations and for other work connected with the department. Their general work is reported on very favourably and they are said to take a great interest in the work.

Throughout the report one is struck with the similarity which appears to prevail between conditions in New Zealand and those of the British Isles, whilst the trees which are being planted most extensively there coincide very nearly with those which find most favour here.

Native trees are not planted to any extent. Kauri pine, Podocarpus Totara, has been tried in some districts but has not given satisfactory results. The trees most largely planted are Larix europaea, Pinus Laricio, Pinus ponderosa, Picea excelsa, P. sitchensis, and Pseudotsuga Douglasii, with Eucalyptus resinifera, E. rostrata, E. Stuartiana, and E. amygdalina in the warmer parts of the country. Other trees, such as Sequoia sempervirens, Thuya plicata (T. gigantea), Tsuga canadensis, Larix leptolepis, Fraxinus excelsior, Fagus sylvatica, Alnus glutinosa, Betula alba, Acer Pseudo-platanus, Liquidambar styraciflua, Pinus muricata, P. insignis, &c., are also being planted in some places. The difficulty of obtaining good seeds of some kinds of trees has led to their being planted in limited quantities only, and if good seeds could be imported more easily much larger plantations would be made.

The rate of growth of the different trees appears to be very similar to that which obtains in England. In favoured localities some conifers add five feet to their height in a single year, whilst in others the average is about 1½ feet.

Pure and mixed plantations are discussed, and the general opinion appears to be the same as the one arrived at in England; some trees give better results as a pure crop and others as a mixed crop. Douglas Fir grows too fast to plant as a mixture, whilst Sequoia sempervirens gives the best results as a pure wood in a sheltered valley. Common Larch appears to thrive everywhere and no disease has been observed. Japanese Larch is planted also, but it grows less rapidly than the common kind; the reverse is the case in the British Isles.

A great deal of attention has of necessity to be given to fire belts. These are made from 1 to 1½ chains wide, and are ploughed over annually until the trees interlace so as to exclude sheep from the plantations when they are sown and pastured. The question of rabbit fencing is as important in New Zealand as it is here, and in some districts all young plantations have to be enclosed in wire netting. The average altitude of the plantations appears to be about 1,000 feet; some, however, are but 300 feet above sea-level, whilst others are as much as 1,900 feet. Winter frost does very little harm, but spring and early summer frosts sometimes cut larch and other early growing trees severely.

In the last nine pages of the report Mr. H. A. Goudie, Superintending Nurseryman, deals with the peculiarities of the trees grown in the North Island, and in addition to other interesting information gives an account of the average number of trees which may be expected from 1 lb. of imported seed of 11 different kinds of trees. That account is appended :—

Name of Species.	Average Number of Trees raised from 1 lb. of Seed.	Average Cost of Seed for 1,000 Trees.	Remarks.
		s. *d.*	
Larix europaea	3,500	0 7·87	Imported from Europe.
Pinus austriaca	4,300	0 11·63	,, ,, ,,
,, Laricio	5,500	0 7·33	,, ,, ,,
,, ponderosa	3,200	3 4	,, ,, America.
,, Strobus	2,000	6 1	,, ,, ,,
,, radiata	11,000	0 3·37	Seed saved in New Zealand.
Pseudotsuga Douglasii ...	5,400	2 5½	Imported from America.
Sequoia sempervirens ...	1,200	12 7	,, ,, ,,
Eucalyptus Stuartiana ...	24,500	0 3½	,, ,, Australia.
,, pauciflora ...	14,500	0 5¼	,, ,, ,,
,, amygdalina ...	24,500	0 2½	,, ,, ,,

W. D.

INDEX.

A.

Acacia spp., gum from, 135.
Acanthopanax Henryi, 166.
Acer griseum, 391.
Achill, algological visit to, 171.
Achnacarry, forestry at, 247.
Achneria Galpinii, *Stapf*, 59.
Achyranthes robusta, *C. H. Wright*, 228.
Aciphylla Dieffenbachii (with plate), 124.
Aconitum Forrestii, *Stapf*, 19.
— stylosum, *Stapf*, 20.
Actinodaphne cuspidata, *Gamble*, 314.
— fragilis, *Gamble*, 315.
— Hullettii, *Gamble*, 314.
— johorensis, *Gamble*, 313.
— montana, *Gamble*, 312.
— oleifolia, *Gamble*, 313.
— Ridleyi, *Gamble*, 312.
African Bass, 169.
Agave Elemeetiana, 65.
— Franzosini, 166.
— lurida, 344.
Agonis marginata, 67.
Agrostis subulifolia, *Stapf*, 130.
Aiton, William, tomb of, 306.
Alchornea glabrata, *Prain*, 342.
Alectorurus yedoensis, 303.
Alloplectus (Nautilocalyx) Forgetii, *Sprague*, 383.
Alnwick Castle, forestry notes at, 12.
Alseodaphne borneensis, *Gamble*, 223.
— insignis, *Gamble*, 221.
— paludosa, *Gamble*, 221.
— pendulifolia, *Gamble*, 222.
— Ridleyi, *Gamble*, 222.
— Wrayi, *Gamble*, 220.
Alsodeia (Pentaloba) Murtonii, *Craib*, 275.
Amanita calabarica, *Massee*, 1.
Amanoa Schweinfurthii, *Baker et Hutchinson*, 56.
Ammannia dentelloides, 254.
Anaphalis deserti, *J. R. Drummond*, 76.
Anderson, J. W., 162.
Angola rubber, 91.
Angsenna tree disease, 95.
Anguloa Cliftoni, *Rolfe*, 160.
Anthoxanthum brevifolium, *Stapf*, 59.
Apples, bitter pit of, 401.
Appointments :—
  Anderson, J. W., 162.
  Bancroft, C. K., 253.
  Bateson, E , 302.
  Chipp, T. F., 132.
Appointments—*cont.*
  Culham, A. B., 197.
  Dodd, E. S., 84.
  Gould, A. R , 253.
  Lewton-Brain, L., 253.
  Maitland, T. D., 64.
  Mawer, E. E., 84.
  Spring, F. G., 302.
  Tutcher, W. J., 349.
  van der Voet, C., 198.
  Wakefield, Miss E. M., 64.
  Wood, W. L., 253.
Aquilegia alpina, 92.
Ardverikie, forestry at, 243.
Aristida Galpinii, *Stapf*, 130.
Aristolochia Curtisii, *King MS. ex Gamble*, 78.
— minutiflora, *Ridley MS. ex Gamble*, 79.
— moupinensis, 201.
Arnold Arboretum, a visit to (with plates), 261.
Arrow-poison from Strophanthus seeds, 139.
Arthrosolen foliosa, *H. H. W. Pearson*, 338.
— sphaerantha, *H. H. W. Pearson*, 338.
Assam, Para rubber in, 260.
Atriplex Bolusii, *C. H. Wright*, 229.

B.

Bacterium tumefaciens, 311.
Bancroft, C. K., 253.
Baobab trees used for storage of water, 98.
Barwood, 330.
Bates, G. L., cultivation of Funtumia elastica in the Cameroons, 206.
Bateson, E., 302.
Begonia, hybrid, 321.
— Martiana, var. grandiflora, 201, 400.
— Pink President Carnot, 321.
Beilschmiedia Curtisii, *Gamble*, 148.
— Foxiana, *Gamble*, 150.
— insignis, *Gamble*, 147.
— Kunstleri, *Gamble*, 147.
— lumutensis, *Gamble*, 148.
— membranacea, *Gamble*, 150.
— pahangensis, *Gamble*, 150.
— penangiana, *Gamble*, 149.
— perakensis, *Gamble*, 149.
— Scortechinii, *Gamble*, 148.
Berberis parvifolia, 391.
Betula Maximowiczii, 303.
Bitter pit of apples, 401.
Bolivia, quinine substitute in, 200.
Bonatea sudanensis, *Rolfe*, 162.

Books :—
Botanical Magazine, 35, 67, 92, 132, 166, 201, 255, 303, 354, 397.
Forests of the Gold Coast, 60.
Report on State Nurseries and Plantations, New Zealand, 402.
Sand dunes of New Zealand, report on, 99.
Subantarctic Islands of New Zealand, 257.
Sugar-cane Wax, 356.
Boswellia Dalzielii, *Hutchinson*, 137.
— odorata, *Hutchinson*, 138.
— —, resin from, 139.
— spp., 137.
Botanic Garden, National, for South Africa, 372.
Botanical Magazine, 35, 67, 92, 132, 166, 201, 255, 303, 354, 397.
Brachylaena Hutchinsii, *Hutchinson*, 126.
Bravoa kewensis, 321.
British Columbia, a medicinal plant from, 260.
— Guiana, Coco-de-Mer in (with plates), 256.
Brown pod disease of Cacao, 94.
Brunsvigia, hybrid, 322.
Buddleia nivea, 392.
Bulbophyllum nigrescens, *Rolfe*, 158.
— trifarium, *Rolfe*, 280.
— virescens, 255.
Butyrospermum Parkii, 134.

C.

Cacao, a disease of, 93.
—, rubber trees as shade for, 208.
—, witches' brooms of, 68.
Calceolaria, hybrid, 322.
— kewensis, 322.
Callipsyche kewensis, 322.
Cameroons, cultivation of Funtumia elastica, 206.
Campanula Beauverdiana, 67.
—, hybrid, 322.
Camphor from Gold Coast, 199.
Camwood, 330.
Carex plesiocephala, *Turrill*, 385.
— runssoroensis, 254.
Carpodinus gracilis, rubber from, 91.
Carruthers, J. B., 254.
Casse, A. E., rubber trees as shade for Cacao, 208.
Catopsis penduliflora, *C. H. Wright*, 197.
Cerastium unalaschkense, *Takeda*, 381.
— Wilsonii, *Takeda*, 381.
Chatham Islands, flora of, 121.
Chatsworth, forestry notes at, 13.
Cheiranthus hybridus, 322.
— kewensis, 322.
China, new Impatiens from, 269
Chinese Rhododendrons, 101.
— Rubi, 45.
Chipp, T. F., 132.
Chirita rupestris, 303.
Chironia (Plocandra) humilis, var. zuluensis, *Prain*, 55.
Chondrospermum coriaceum, 37, 44.
Chrysoxylon febrifugum, 200.
Cinnamomum aureo-fulvum, *Gamble*, 220.
— cinereum, *Gamble*, 220.
— Deschampsii, *Gamble*, 219.
— graciliflorum, *Gamble*, 218.
— Ridleyi, *Gamble*, 218.
— Scortechinii, *Gamble*, 219.
Cirrhopetalum biflorum, 166.
Clare Island, algological visit to, 171.
Claremont, trees at, 163.
Cleidion Mannii, *Baker*, 58.
— Preussii, *Baker*, 343.
Clematis nutans, 392.
Cliffortia Burchellii, *Stapf*, 328.
Cobham Hall, trees at, 97.
Cocoanut, stem bleeding disease of, 93.
Coco-de-Mer in British Guiana (with plates), 256.
Codium elongatum, 171.
Coelogyne Mooreana, 67.
Columnea Oerstediana, 354.
Combretum spp., gum from, 136.
Cordeauxia edulis, 398.
Cornus florida, var. rubra, 166.
— Nuttallii, 132.
Corrour, forestry at, 242.
Corydalis spathulata, *Prain MS. ex Craib*, 73.
Corylopsis Veitchiana, 397.
Corynocarpus laevigata (with fig.), 122.
Craterosiphon Soyauxii, *H. H. W. Pearson*, 340.
Crotalaria lachnosema, *Stapf*, 329.
Crown-gall (with plate), 309.
Cryptocarya apamaefolia, *Gamble*, 146.
— areolata, *Gamble*, 144.
— argentea, *Gamble*, 144.
— bracteolata, *Gamble*, 143.
— bubongana, *Gamble*, 144.
— fagifolia, *Gamble*, 145.
— Forbesii, *Gamble*, 146.
— longepaniculata, *Gamble*, 145.
— macrophylla, *Gamble*, 147.
— paucinervia, *Gamble*, 145.
— Scortechinii, *Gamble*, 143.
— Wrayi, *Gamble*, 142.
Culham, A. B., 197.
Cupú-açú, 164.
Cupuahy, 165.
Cussonia (Eucussonia) nigerica, *Hutchinson*, 136.
— — —, gum from, 136.
Cycas Micholitzii, 163.
Cymbidium insigne, 166.
Cynorchis kewensis, 323.
— Morlandii, *Rolfe*, 283.

Cytisus Beanii, 323.
— Dallimorei, 323.
— kewensis, 323.

D.

Dalziel, J. M., notes on the botanical resources of Yolo Province, Northern Nigeria, 133.
Daniella thurifera, 137.
Dawson, Jackson, 267.
Decades Kewenses, 19, 73, 192, 275, 381.
Dehaasia Curtisii, *Gamble*, 151.
— nigrescens, *Gamble*, 150.
Dendrobium Sanderae, 397.
Dendrophagus globosus, 309.
Derris, 386.
— Yappii, *Craib*, 21.
Desmodium longipes, *Craib*, 20.
Diagnoses Africanae, 55, 126, 182, 228, 328.
Dicranolepis glandulosa, *H. H. W. Pearson*, 339.
— polygaloides, *Gilg ex H. H. W. Pearson*, 339.
— pubescens, *H. H. W. Pearson*, 340.
— stenosiphon, *H. H. W. Pearson*, 339.
Die-back of Cacao, 94.
— — — Hevea brasiliensis, 172.
Diospyros (Ermellinus) strigosa, *Hemsl.*, 193.
Dipelta floribunda, 132.
— ventricosa, 35.
Diplodia cacaoicola, 93, 172.
— rapax, *Massee*, 3.
Disa kewensis, 323.
— Premier, 323.
Diseases of plants :—
Angsenna tree disease, 95.
Bitter pit of apples, 401.
Brown pod of Cacao, 94.
Cacao diseases, 68, 93.
—, witches' brooms of, 68,
Cocoanut, stem bleeding disease of, 93.
Crown-gall (with plate), 309.
Dendrophagus globosus, 309.
Die-back of Cacao, 94.
— — Hevea brasiliensis, 172.
Diplodia cacaoicola, 93, 172.
Eutypa caulivora on Para rubber trees (with plates), 251.
Gloeosporium alborubrum, 172.
Lasiodiplodia theobromae, 172.
Polystictus occidentalis, 95.
Thielaviopsis paradoxa, 93.
Witches' brooms of Cacao, 68.
Dorrien-Smith, Capt. A. A., an attempt to introduce Olearia semidentata into the British Isles (with plates), 120.
Dracontium gigas, 27.
Drummond, J. R., Agave lurida, 344.
Dunbaria longeracemosa, *Craib*, 277.
Dunn, S. T., Hongkong herbarium, 188.
—, Leptoderris, a new genus of Leguminosae, 386.
Duvalia sulcata, *N. E. Brown*, 193.

E.

Ekebergia Meyeri (with plate), 53.
Elaphomyces sapidus, *Massee*, 252.
Endiandra Forbesii, *Gamble*, 153.
— Kingiana, *Gamble*, 151.
— praeclara, *Gamble*, 152.
— Wrayi, *Gamble*, 152.
Entandrophragma, Leioptyx and Pseudocedrela, 177.
— caudatum, *Sprague*, 180.
— cylindricum, *Sprague*, 180.
— excelsum, *Sprague*, 180.
— utile, *Sprague*, 180.
Epacris bawbawiensis, *Stapf* (with fig.), 217.
— breviflora, *Stapf* (with figs), 216.
— dubia, 213.
— heteronema (with figs.), 213.
— Stuartii, *Stapf* (with figs.), 217.
Epidendrum kewense, 323.
Erica arborea, var. alpina, 395.
Eria rhodoptera, 35.
Esschenout, 53.
—, red, 53.
Essenwood, 53.
Eucryphia pinnatifolia, 352.
Eulophia aliwalensis, *Rolfe*, 368.
— circinnata, *Rolfe*, 280.
— Engleri, *Rolfe*, 282.
— gladioloides, *Rolfe*, 281.
— Haygarthii, *Rolfe*, 370.
— longipes, *Rolfe*, 280.
— Nelsoni, *Rolfe*, 369.
— oblonga, *Rolfe*, 370.
— ovatipetala, *Rolfe*, 281.
— purpurascens, *Rolfe*, 281.
— robusta, *Rolfe*, 369.
— Saundersiae, *Rolfe*, 368.
— Thunbegii, *Rolfe*, 369.
— transvaalensis, *Rolfe*, 282.
Euphrasia idzuensis, *Takeda*, 194.
— Iinumae, *Takeda*, 193.
— Makinoi, *Takeda*, 195.
Eu-Schoenoxiphium, *Kükenthal*, 130.
Eutypa caulivora, *Massee* (with plates), 251.

F.

Fibre plants in Northern Nigeria, 139.
Flora of North-western States, Malay Peninsula, 202.
Flowers out of season, 356.
Forestry in New Zealand, 402.
— — the highlands of Scotland, 239.
— notes, 6.

Forests of the Gold Coast, 60.
Fothergilla major (with plate), 394.
Fouquieria splendens, 166.
Freesia kewensis, 323.
Fungi Exotici (with plates), 1, 249.
Funtumia elastica in the Cameroons, 206.

G.

Galera Burkillii, *Massee*, 2.
Galpinia, *Kükenthal*, section of Schoenoxiphium, 130.
Galls on an Indian grass (with plate), 69.
Gamble, J. S., new Lauraceae from Malayan region, 142, 218, 312, 357.
Gamogyne pulchra, *N. E. Brown*, 197, 255.
Gardens of the Malay Peninsula, history of, 153.
Garnotiella, 301.
— leptos, 302.
Ginkgo biloba, 397.
Gladioli, hybrid, 324.
Gloeosporium alborubrum, 172.
— citri, *Massee*, 4.
Gnidia montana, *H. H. W. Pearson*, 337.
— nutans, *H. H. W. Pearson*, 337.
— ramosa, *H. H. W. Pearson*, 338.
— Thomsoni, *H. H. W. Pearson*, 337.
Gold Coast, forests of, 60.
Gomphostemma intermedium, *Craib*, 23.
Gould, A. R., 253.
Grain tree, 167.
Guayule rubber, 211.
Gums and resins :—
Acacia spp., 135.
Combretum spp., 136.
Copaiba balsam, West African, 137.
Copal, West African, 137.
Cussonia nigerica, 136.
Daniella thurifera, 137.
'Falli,' 134.
'Marrua,' 134.
'Mumuye,' 134.
Odina sp., 137.
Pterocarpus erinaceus, 137.

H.

Hartiella, *Massee*, gen. nov., 5.
— coccinea, *Massee*, 5.
Haydon Bridge, forestry notes at, 11.
Hemsley, W. B., Chinese Rhododendrons, 101.
Hendersonia microspora, *Massee*, 4.
Hermbstaedtia rubromarginata, *C. H. Wright*, 228.
Hevea brasiliensis, die-back of, 172.
— —, diseases of, 3, 172, 251.
— — in Assam, 260.
Hibiscus glanduliferus, *Craib*, 275.
Hongkong herbarium, 188.
Hooker, Sir J. D., new Impatiens from China, 269.
—, — —, — — — India, 291.
Houlletia Sanderi, 354.
Hoya fuscomarginata, *N. E. Brown*, 278.
Hybrids raised at Kew, 321.
Hypholoma Talbotiae, *Massee*, 249.

I.

Impatiens bababudenensis, *Hk. f.*, 295.
— brevipes, *Hk. f.*, 271.
— chinensis, 292.
— corchorifolia, 273.
— desmantha, 273.
— distracta, *Hk. f.*, 272.
— Faberi, *Hk. f.*, 274.
— Gardneriana, 295.
— gasterocheila, *Hk. f.*, 272.
— gibbisepala, *Hk. f.*, 298.
— Huberti, *Hk. f.*, 74.
—, Indian species of, 291.
— Kleinii, 293.
— laevigata, var. grandifolia, *Hk. f.*, 299.
— latebracteata, *Hk. f.*, 273.
— longirama, *Hk. f.*, 297.
— Meeboldii, *Hk. f.*, 291.
— microstachys, *Hk. f.*, 271.
— Nataliae, *Hk. f.*, 294.
—, new, from China, 269.
— odontosepala, *Hk. f.*, 299.
— orthosepala, *Hk. f.*, 74.
— pahalgamensis, *Hk. f.*, 291.
— pterosepala, *Hk. f.*, 274.
— pusilla, 293.
— — var. nematostachys, *Hk. f.*, 294.
— rubrolineata, *Hk. f.*, 300.
— rupicola, *Hk. f.*, 292.
— spissiflora, *Hk. f.*, 296.
— teneriflora, *Hk. f.*, 296.
— tortisepala, *Hk. f.*, 270.
— tripetala, var. microscypha, *Hk. f.*, 298.
— Winkleri, *Hk. f.*, 75.
Indigo, 283.
Indigofera Lacei, *Craib*, 382.
Invergarry, forestry at, 246.
Iris Clarkei, 201.
— minuta, 35.
— Wilsonii, 303.
Ischaemum pilosum, galls on (with plate), 69.

J.

Jacobinia suberecta, 397.
Jequié Maniçobas, 204.
Jodrell Laboratory, research in, 30.

K.

Kalanchoe kewensis, 324.
Kalmia cuneata, 166.
— latifolia (with plate), 265.
Kew :—
Flowers out of season, 356.
Gardens, additions to, 25.
Herbarium, additions to, 32.
Hybrids raised at, 321.
Jodrell Laboratory, research in, 30.
Library catalogue, supplement to, Appendix II.
—, presentations to, 33, 65.
Museums, 28.
—, presentations to, 29, 198, 353.
Pathological research at, 31.
Taitokuin Shrine, 396.
Visitors in 1909, 24.
Waterfowl at, 27.
Wild Fauna and Flora, additions to (with figs.), 79.
Kniphofia kewensis, 324.
— Wyliei, *N. E. Brown*, 129.
Kordofan, use of baobab trees for storage of water, 98.

L.

Landolphia ugandensis, 304.
Larix Potaninii (with plate), 173.
Lasiodiplodia theobromae, 172.
Lasiosiphon Kerstingii, *H. H. W. Pearson*, 338.
Lauraceae, new, from Malayan region, 142, 218, 312, 357.
Leathesia crispa, 171.
Legat, C. E., Trees of the North-Eastern Transvaal (with plates), 49.
Leioptyx, Entandrophragma and Pseudocedrela, 177.
Lentinus egregius, *Massee*, 249.
Lenzites adusta, *Massee*, 250.
Leontopodium fimbrilligerum, *J. R. Drummond*, 76.
— paradoxum, *J. R. Drummond*, 77.
Leptoderris, *Dunn*, gen. nov., 386.
— brachyptera, *Dunn*, 388.
— calva, *Dunn*, 391.
— congolensis, *Dunn*, 390.
— fasciculata, *Dunn*, 390.
— glabrata, *Dunn*, 390.
— Goetzei, *Dunn*, 389.
— Harmsiana, *Dunn*, 389.
— hypargyrea, *Dunn*, 388.
— Kirkii, *Dunn*, 389.
— macrothyrsa, *Dunn*, 391.
— micrantha, *Dunn*, 389.
— nobilis, *Dunn*, 389.
— nyanzae, *Dunn*, 390.
— reticulata, *Dunn*, 390.
Leucospermum Bolusii, *Phillips*, 330.
— Dregei, *Phillips*, 331.
— glabrum, *Phillips*, 331.
— incisum, *Phillips*, 331.
— mixtum, *Phillips*, 332.
— Muirii, *Phillips*, 332.
Lewton-Brain, L., 253.
Ligusticum Canbyi, 260.
Lilium kewense, 324.
Lindera Wrayi, *Gamble*, 367.
Lissochilus Andersoni, *Rolfe*, 159.
— Johnsoni, *Rolfe*, 164.
Listrostachys imbricata, *Rolfe*, 161.
Litsea artocarpifolia, *Gamble*, 316.
— claviflora, *Gamble*, 363.
— Curtisii, *Gamble*, 363.
— cylindrocarpa, *Gamble*, 318.
— fenestrata, *Gamble*, 360.
— Foxiana, *Gamble*, 361.
— gracilis, *Gamble*, 317.
— hirsutissima, *Gamble*, 357.
— — var. geniculata, *Gamble*, 357.
— johorensis, *Gamble*, 315.
— Kunstleri, *Gamble*, 363.
— machilifolia, *Gamble*, 320.
— — var. angustifolia, *Gamble*, 321.
— megacarpa, *Gamble*, 364.
— monticola, *Gamble*, 361.
— nidularis, *Gamble*, 365.
— oblanceolata, *Gamble*, 362.
— patellaris, *Gamble*, 360.
— perakensis, *Gamble*, 359.
— pustulata, *Gamble*, 359.
— quercina, *Gamble*, 318.
— Ridleyi, *Gamble*, 317.
— sarawacensis, *Gamble*, 365.
— Scortechinii, *Gamble*, 362.
— singaporensis, *Gamble*, 358.
— spathacea, *Gamble*, 358.
— — var. tomentosa, *Gamble*, 358.
— Teysmanni, *Gamble*, 319.
— trunciflora, *Gamble*, 316.
— Wrayi, *Gamble*, 319.
— ujongensis, *Gamble*, 366.
— — var. nervosa, *Gamble*, 366.
Lodoicea sechellarum (with plates), 256.
Lonchocarpus brachyptera, 386.
— fasciculatus, 386.
Lycaste lata, *Rolfe*, 370.
— peruviana, *Rolfe*, 160.

M.

Macaranga Beillei, *Prain*, 239.
— Paxii, *Prain*, 127.
— Rowlandii, *Prain*, 127.
Machilus phoenicis, *Dunn*, 279.
— Scortechinii, *Gamble*, 226.
MacOwan, Dr. P., 84.
Macrosporium lanceolatum, *Massee*, 5.
Maitland, T. D., 64.

Malay Peninsula, Flora of North-western States, 202.
— —, history of the gardens of, 153.
Malayan region, new Lauraceae from, 142, 218, 312, 357.
Mancono, 198.
Maniçobas, Jequié, 204.
Manihot dichotoma, 204.
— piauhyensis, 204.
— preciosa, 96.
Marasmius scandens, *Massee*, (with figs.) 1.
— sordidus, *Massee*, 249.
Medicinal plant from British Columbia, 260.
Megabaria, *Pierre MS. ex Hutchinson*, 56.
— Trillesii, *Pierre MS. ex Hutchinson*, 57.
— ugandensis, *Hutchinson*, 57.
Megaclinium lutescens, *Rolfe*, 158.
Melica brevifolia, *Stapf*, 131.
Meliosma Veitchiorum, (with plate) 173.
Micholitzia obcordata, 201.
Microcarpaea muscosa, 254.
Micromeles caloneura, *Stapf*, 192, 303.
Microtea gracilis, *A. W. Hill*, 56.
Millettia, 386.
Millottia depauperata, *Stapf*, 22.
Miscellaneous notes, 24, 64, 84, 132, 162, 197, 253, 302, 349, 396.
Musa kewensis, 324.
Myxopyrum, 37.
— cordatum, *A. W. Hill*, 44.
— coriaceum, 44.
— ellipticum, *A. W. Hill*, (with figs.) 42.
—Horsfieldii, *A. W. Hill*, (with figs.) 43.
— macrolobum, *A. W. Hill*, (with figs.) 42.
— nervosum, 42.
— ovatum, *A. W. Hill*, (with figs.) 41.
— serratulum, *A. W. Hill*, (with figs.) 41.
— smilacifolium (with figs.), 40.
— — var. ilicifolium, 40.
— Zippelii, *A. W. Hill*, 44.

N.

Nandi rubber, 304.
Nautilocalyx, 384.
Necepsia, *Prain*, gen. nov., 343.
— Afzelii, *Prain*, 343.
Nectria theobromicola, *Bancroft*, 250.
Neoglaziovia concolor, 397.
New garden plants, Appx. III.
— Zealand forest, 36.
— —, forestry in, 402.
— —, sand dunes of, 99.
— —, the subantarctic islands of, 257.
Notaphoebe fruticosa, *Gamble*, 223.
— Havilandi, *Gamble*, 225.
— Kingiana, *Gamble*, 224.
— — var. glabrescens, *Gamble*, 224.
— reticulata, *Gamble*, 224.
— sarawacensis, *Gamble*, 225.
Northern Nigeria, botanical resources of Yola Province, 133.
Nothofagus antarctica, var. uliginosa, 166.
Notylia trisepala, 92.
Nymphaea kewensis, 325.

O.

Obituary notices :—
Carruthers, J. B., 254.
Cooke, Dr. Theodore, 350.
MacOwan, Dr. P., 84.
Treub, Dr. Melchior, 349.
Odina, sp., gum from, 137.
Oldenlandia Prainiana, *Craib*, 278.
Olearia semidentata, attempted introduction into British Isles (with plates), 120.
— —, var. albiflora (with plate), 125.
Oligotrophus ischaemi, *Kieffer*, 71.
Oncidium (Cimiciferum) Ballii, *Rolfe*, 371.
Ophiobolus calathus, *Massee* (with figs.), 2.
Orchids, new, 158, 280, 368.
Osmanthus Delavayi, 393.
Osun, 330.
Osyris angustifolia, *Baker*, 238.
— parvifolia, *Baker*, 239.
Ourisia macrophylla, 35.
Oxytenanthera Lacei, *Gamble*, 385.

P.

Para rubber, fungi parasitic on, 3, 172, 251.
— — in Assam, 260.
Parthenium argentatum, 211.
Patrinia triloba, 255.
Pearson, Prof. H. H. W., a National Botanic Garden for South Africa, 372.
Peddiea cyathulata, *H. H. W. Pearson*, 341.
Penaea dubia, *E. L. Stephens*, 237.
Penang Botanic Gardens, 153.
Pertya sinensis, 174.
Phaius Cooperi, *Rolfe*, 159.
Philadelphus Delavayi, 201.
Phoebe Forbesii, *Gamble*, 227.
— Kunstleri, *Gamble*, 226.
Phoma welwitschiae, *Massee*, 253.
Phyllanthodendron album, *Craib et Hutchinson*, 279.
— roseum, *Craib et Hutchinson*, 23.

Piassava, 169.
Picea complanata, 174.
Pilula, *Massee*, gen. nov., 252.
— straminea, *Massee*, 252.
Pinus Armandii, 397.
Pistacia chinensis (with plate), 393.
Pittosporum Colensoi, 92.
Pityrodia flexuosa, *Price*, 384.
Plagianthus betulinus, var. chathamicus (with fig.), 125.
Pleiocarpa mutica, 354.
Pogonopus febrifugus, var. macrosema, *Hutchinson*, 200.
Polyporus confusus, *Massee*, 250.
— indicus, *Massee*, 250.
Polystachya Talbotii, *Rolfe*, 282.
Polystictus occidentalis, 96.
Populus nigra, var. betulifolia, 67.
Primula Forrestii, 166.
— kewensis, 325.
— Littoniana, 303.
Primulas, hybrid, 325.
Protea asper, *Phillips*, 236.
— Baurii, *Phillips*, 232.
— Bolusii, *Phillips*, 231.
— convexa, *Phillips*, 235.
— decurrens, *Phillips*, 236.
— Flanaganii, *Phillips*, 232.
— ignota, *Phillips*, 229.
— Marlothii, *Phillips*, 233.
— multibracteata, *Phillips*, 230.
— natalensis, *Phillips*, 231.
— Pegleri, *Phillips*, 230.
— pityphylla, *Phillips*, 234.
— scabriuscula, *Phillips*, 236.
— simplex, *Phillips*, 232.
— sulphurea, *Phillips*, 234.
— Susannae, *Phillips*, 229.
— trigona, *Phillips*, 230.
— undulata, *Phillips*, 233.
— witzenbergiana, *Phillips*, 234.
— Zeyheri, *Phillips*, 235.
Pseudocedrela, Entandrophragma and Leioptyx, 177.
Pseudopanax chathamicum (with fig.), 122.
Psoralea affinis, 255.
Pterocarpus erinaceus, 137.
— indicus, disease of, 95.
— Osun, *Craib*, 329.
Pterocarya Rehderiana, 395.
Pterostyrax hispidum, 255.
Puccinia sclerolaenae, *Massee*, 3.
Pueraria alopecuroides, *Craib*, 276.
Pyracantha angustifolia, 354.
Pyrus Folgneri, 175.

Q.

Quercus coccifera, 168.
— pontica, 177.
Quinine substitute in Bolivia, 200.

R.

Raby Castle, forestry notes at, 10.
Raphia vinifera, 169.
Rehmannia Briscoei, 325.
— Henryi, 92.
—, hybrid, 325.
Rhododendron Brettii, *Hemsl. et E. H. Wils.*, 106.
— emarginatum, *Hemsl. et E. H. Wils.*, 118.
— excellens, *Hemsl. et E. H. Wils.*, 113.
— flavidum, 201.
— Harrovianum, 132.
— Hemsleyanum, *E. H. Wils.*, 109.
— Houlstonii, *Hemsl. et E. H. Wils.*, 110.
— insigne, *Hemsl. et E. H. Wils.*, 113.
— Keiskei, 67.
— kewense, 325.
— mucronulatum, 92.
— Rirei, *Hemsl. et E. H Wils.*, 111.
— Sheltonae, *Hemsl. et E. H. Wils.*, 108.
— Spooneri, *Hemsl. et E. H. Wils.*, 110.
— Tutcherae, *Hemsl. et E. H. Wils.*, 116.
— Ungernii, 303.
— villosum, *Hemsl. et E. H. Wils.*, 119.
— Wasonii, *Hemsl. et E. H. Wils.*, 105.
— Watsonii, *Hemsl. et E. H. Wils.*, 112.
— Wilsonae, *Hemsl. et E. H. Wils.*, 116.
— Wiltonii, *Hemsl. et E. H. Wils.*, 107.
— Wongii, *Hemsl. et E. H. Wils.*, 117.
Rhododendrons, Chinese, 101.
—, hybrid, 326.
Ridley, H. N., Flora of N.W. States, Malay Peninsula, 202.
Rosa gigantea, 162.
— Moyesii, 303.
Rose, hybrid, 326.
—, 'Prof. C. S. Sargent, 267.
Rotherham, effects of smoke on trees, 9.
Rubi, Chinese, 45.
Rubus (Idaeobatus) adenophorus, *Rolfe*, 382.
— chroösepalus, 45.
— coreanus, 46.
— corchorifolius, 46.
— hupehensis, 46.
— irenaeus, 47.
— omeiensis, 47.
— Parkerii, 47.
— Playfairii, 48.
— polytrichus, 48.
— Veitchii, 49.

Rubber, Angola, 91.
— from Gold Coast, 199.
—, Guayule, 211.
—, Nandi, 304.
— trees as shade for Cacao, 208.
— —, Funtumia elastica in the Cameroons, 206.
— —, Jequié Manicobas, 204.
— —, Landolphia ugandensis, 304.
— —, Manihot preciosa, 96.
— —, Para, in Assam, 260.

S.

Sand dunes of New Zealand, 99.
Sapium anadenum, 199.
— jamaicense, 199.
— pleiostachys, 199.
Sarcococca ruscifolia, *Stapf*, 394.
Sargent, Prof. C. S., 261.
Saussurea tanguensis, *J. R. Drummond*, 78.
Saxifraga Grisebachii, 132.
Schoenoxiphium filiforme, *Kükenthal*, 129.
Schönland, Dr. S., obituary notice of Dr. P. MacOwan, 84.
Scleria Kerrii, *Turrill*, 384.
Scleroderris gigaspora, *Massee* (with figs.), 3.
Scotland, forestry in the highlands, 239.
Scutellaria violacea, 166.
Sebastiania inopinata, *Prain*, 128.
Seeds available for distribution, Appx. I.
Senecio kewensis, 327.
— Lady Thiselton-Dyer, 327.
Septocylindrium suspectum, *Massee*, 4
Shea butter-nut, 134.
Shortia, hybrid, 327.
Sigmatostalix peruviana, *Rolfe*, 371.
Singapore Botanic Gardens, 153.
Sonerila Kerrii, *Craib et Stapf*, 22.
Sordaria crustosa, *Massee* (with figs.), 2.
Sorocephalus imberbis, figs., 287.
South Africa, National Botanic Garden for, 372.
Spatalla Bolusii, *Phillips*, 333.
— brachyloba, *Phillips*, 333.
— Burchellii, *Phillips*, 333.
— cylindrica, *Phillips*, 334.
— ericoides, *Phillips*, 334.
— Galpinii, *Phillips*, 334.
— gracilis, figs., 287.
— mucronifolia, *Phillips*, 335.
— pilosa, *Phillips*, 335.
— Wallichii, *Phillips*, 336.
Spatallopsis, *Phillips*, gen. nov., 286.
— caudaeflora, *Phillips* (with figs.), 289.
— caudata, *Phillips* (with figs.), 290.
— confusa, *Phillips* (with figs.), 289.
— ericaefolia, *Phillips* (with figs.), 288.
— propinqua, *Phillips* (with figs), 290.
Spathoglottis kewensis, 327.
Sphaerulina Worsdellii, *Massee*, 252.
Spring, F. G., 302.
Staffs of Botanical Departments, list of, Appx. IV.
Stanhopea elegantula, *Rolfe*, 161.
Staphylea holocarpa, 175.
Stemmatodaphne, *Gamble*, gen. nov., 227.
— perakensis, *Gamble*, 227.
Sterigmatocystis corolligena, *Massee*, 5.
Strelitzia, hybrid, 327.
— kewensis, 65, 327.
Streptocarpus Dyeri, 328.
— kewensis, 328.
— Watsoni, 327.
— White Pet, 328.
Strobilanthes (Acanthopale) Meeboldii, *Craib*, 278.
Strophanthus seeds, arrow-poison from, 139.
Struthiola Albersii, *H. H. W. Pearson*, 336.
— Gilgiana, *H. H. W. Pearson*, 336.
Stylochiton Dalzielii, *N. E. Brown*, 58.
Styrax Hemsleyanus, 303.
Subantarctic Islands of New Zealand, 257.
Sugar-cane wax, 355.
Swainsona Incei, *Price*, 382.
Synaptolepis retusa, *H. H. W. Pearson*, 340.
Syringa Bretschneideri, 35.
— pinnatifolia, 176.

T.

Tabebuia stenocalyx, *Sprague et Stapf*, 196.
Taitokuin Shrine, 396.
Tetradenia kedahensis, *Gamble*, 367.
— mollissima, *Gamble*, 366.
Thecacoris Batesii, *Hutchinson*, 58.
Theobroma grandiflorum, 164.
— subincanum, 165.
Thesium atrum, *A. W. Hill*, 182.
— brachyanthum, *Baker*, 182.
— cinereum, *A. W. Hill*, 182.
— cymosum, *A. W. Hill*, 183.
— Dinteri, *A. W. Hill*, 341.
— ephedroides, *A. W. Hill*, 183.
— fastigiatum, *A. W. Hill*, 183.
— fenarium, *A. W. Hill*, 184.
— filipes, *A. W. Hill*, 184.
— fimbriatum, *A. W. Hill*, 184.
— fulvum, *A. W. Hill*, 185.
— fuscum, *A. W. Hill*, 185.
— gracile, *A. W. Hill*, 185.
— longirostre, *Schlechter*, 186.
— masukense, *Baker*, 186.
— megalocarpum, *A. W. Hill*, 341.
— mukense, *A. W. Hill*, 186.
— myriocladum, *Baker*, 186.

Thesium palliolatum, *A. W. Hill*, 187.
— pilosum, *A. W. Hill*, 187.
— resedoides, *A. W. Hill*, 187.
— tamariscinum, *A. W. Hill*, 188.
— tetragonum, *A. W. Hill*, 237.
— triste, *A. W. Hill*, 238.
— viride, *A. W. Hill*, 238.
— xerophyticum, *A. W. Hill*, 342.
Thielaviopsis paradoxa, 93.
Thompson, H. N., 'Forests of the Gold Coast,' 60.
Tragia (Tagira) Benthami, *Baker*, 128.
Transvaal, North-Eastern, trees of, (with plates) 49.
Trees and shrubs, new, garden notes on, 45, (with plates) 173, 391.
— of the North-Eastern Transvaal, (with plates) 49.
Trichilia emetica (with plate), 53.
Tripterygium Wilfordi, 176.
Tristellateia australis, 303.
Tsuga yunnanensis, 176.
Tutcher, W. J., 349.
Typhonodorum Lindleyanum, 132.

U.

Ulmus racemosa, plate facing 266.
Ulva latissima, growth of, in water polluted by sewage, 15.
Uraria Lacei, *Craib*, 276.
Urceocharis edentata, *C. H. Wright*, 24.
Utricularia Cavalerii, *Stapf*, 195.

V.

Van der Voet, C., 198.
Vernonia Curtisii, *Craib et Hutchinson*, 22.
Veronica gigantea (with fig.), 122.

W.

Wakefield, Miss E. M., 64.
Wild Fauna and Flora of Kew, additions to (with figs.), 79.
Wilson, E. H., Chinese Rhododendrons, 101.
Witches' brooms of Cacao, 68.
Wood, W. L., 253.
Wortley Hall, forestry notes at, 14.

X.

Xanthostemon Verdugonianus, 198.
Xeronema Moorii, 354.
Xylaria Pattersonii, *Massee*, (with figs.) 2.

Y.

Yeheb, 398.
Yola Province, botanical resources of, 133.